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INTERNATIONAL CLINICS

A QUARTERLY

OF

ILLUSTRATED CLINICAL LECTURES AND
ESPECIALLY PREPARED ORIGINAL ARTICLES

ON

TREATMENT, MEDICINE, SURGERY, NEUROLOGY, PEDIATRICS,
OBSTETRICS, GYNECOLOGY, ORTHOPEDICS,
PATHOLOGY, DERMATOLOGY, OPHTHALMOLOGY,
OTOLOGY, RHINOLOGY, LARYNGOLOGY,
HYGIENE, AND OTHER TOPICS OF INTEREST
TO STUDENTS AND PRACTITIONERS

BY LEADING MEMBERS OF THE MEDICAL PROFESSION
THROUGHOUT THE WORLD

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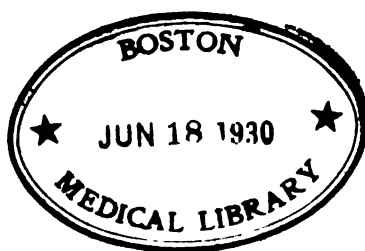
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Treatment

THE MEDICAL TREATMENT OF EXOPHTHALMIC GOITER

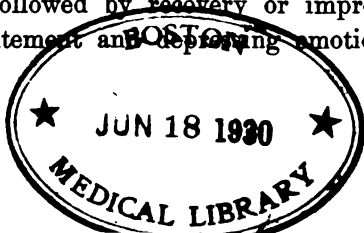
BY JAMES TYSON, M.D.

Professor of Medicine in the University of Pennsylvania

THE medical treatment of exophthalmic goiter is at best unsatisfactory because there is no rational treatment and there can be no rational treatment as long as we have no more definite knowledge of its pathology. If, as seems likely, the disease is due to a deranged secretion or over activity of the thyroid gland, a cytotoxin which produces its symptoms, experience with analogous diseases makes it reasonable to expect that an antitoxin may be found which will counteract those symptoms. Indeed, it would seem that we are on the eve of such discovery through the studies of Moebius and others abroad, and of MacCallum, Rogers and Beebe, of this country. The results, however, are as yet too unsettled to justify much space in a paper intended to be practical.

On the other hand, it is well known that patients with exophthalmic goiter recover, some completely and others partially, without the aid of such a specific agent. It is said that 40 per cent. of patients recover under medical treatment, but improvement is more frequent than recovery. In a considerable experience I have known only one patient to die. I do not mean that all patients I have treated recovered. Many passed from under my observation, either totally or partially unrelieved. The fatal case was one of relapse after a long and trying railroad journey.

In the absence of a knowledge of a specific remedy, therefore, it remains only to call attention to such measures of treatment as have been followed by recovery or improvement. Since worry, fatigue, excitement and depressing emotions have been found to



cause the disease, it is evident that patients should be surrounded by the opposite of such conditions, namely, physical rest, cheerfulness and absence of excitement. Such a course alone is probably sufficient to cure many mild cases of short duration before coming under treatment. Rest in the recumbent position may be necessary, while residence in a sanatorium or hospital away from family is often helpful. For the same reason alcoholic stimulants and stimulating indigestible foods are contraindicated. Food should, however, be nourishing. Prohibition may sometimes extend to tea and coffee. Sexual indulgence and pregnancy should be disjoined. On the other hand fresh air and out-door life without over exertion are often beneficial.

It is usual, however, to associate with such treatment the administration of drugs. They should be deferred until rest has been tried. Of these the bromides and digitalis and its class are conspicuous, and probably first prescribed in the majority of cases. They should be given in moderate doses at first; indeed massive doses are contraindicated, and if the tachycardia does not subside under moderate doses of digitalis or strophanthus, they should be discontinued. Ten to fifteen minims of the tincture of either drug, made as directed by the new pharmacopeia, three or at most four times a day, should not be exceeded. Larger doses tend to exhaust the heart muscle. Nor should bromides be given in very large doses, fifteen grains four times a day being the maximum dose, and it is better to get along with smaller doses if possible. I have found *veratrum viride* in lieu of digitalis to act well in conjunction with the bromides. In like manner aconite may be expected to be of service when there is strong cardiac action. Among other remedies, ergot has been recommended but I have had no experience with it. Belladonna is, however, useful in some cases for the same reason that it is helpful in certain cardiac cases, and I am especially fond of a fresh belladonna plaster over the region of the heart. Ord and MacKenzie, who also speak favorably of the drug, consider it acts on the nervous system. Ten minims of the tincture three times a day is the dose to be commenced with.

Professor William H. Thomson, of New York, ascribes Graves' disease to gastro-intestinal ptomain poisoning, due to excessive

meat ingestion, and accordingly insists upon absolute restriction to a milk diet which he says should be kept up for two years; koumiss and the like being substituted when the ordinary milk is not well borne. Presumably he considers that the meat ptomains are being gradually eliminated during these two years, while the milk diet guards against their formation. On the other hand the undoubted relief afforded by operative treatment in certain instances, goes to show that if the symptoms are due to a toxin, such toxin is developed in the thyroid gland itself,—a cytotoxin as already suggested.

Among other special treatments is that by suprarenal extract recommended in tablet form, five grains (0.3 gram) at a dose thrice daily. Treatment by thyroid extract theoretically should make the disease worse, and experience tends to confirm this, though such result has not been invariable. There is some evidence on the other hand, that thymus extract has seemed to be beneficial in ten to fifteen grain (0.6 to 1.0 gram) doses. Dr. J. N. Hunsberger, of Skippack, Pa., has called my attention to the efficacy of nux vomica, beginning with doses of 25 drops, (1.5 c.c.) and increasing to 50 drops (3 c.c.). He informs me that in three months after treatment was commenced the patient was able to do all her work and has continued well ever since.

Opium in small doses has been recommended, but according to Ord and MacKenzie is not well borne. It is certainly a rational remedy, quieting the irritability which lies at the foundation of the disease, but I prefer codein because it is less apt to be associated with the harmful effects which attend the use of opium, especially constipation and the opium habit. Iodides are of doubtful value, but iron and arsenic should be beneficial. They cannot do harm at any rate.

I have myself no experience with electricity, but I think that in view of the results claimed by German physicians a more systematic trial should be made than has been in this country. I therefore add some details of the methods employed. A constant galvanic current of from five to eight cells is recommended, the negative pole being placed on the fifth cervical vertebra, the positive along the sternum. Erb recommends that the positive pole be placed upon the cervical spine and the cathode upon the peripheral

nerves. Oppenheim has had good results with stabile galvanization of the sympathetic when applied as follows: The cathode electrode of a diameter of two or three centimeters is placed external to the large cornu of the hyoid bone between the angle of the lower jaw and the inner border of the sternocleidomastoid muscle; the other and larger anode above the level of the fifth to seventh cervical vertebræ. A gradually increasing current of two to five miliamperes, is applied and shut off after two or three minutes. Weak currents only should be used. Vigouroux also recommends faradization as follows: A broad anode of seven to eight centimeters in diameter is placed on the neck, and a small cathode of one centimeter in diameter upon the sympathetic, for about one and a half minutes on each side, with a current just strong enough to cause contraction of the sternocleidomastoid; then upon the motor-points of the orbicularis palpebrarum muscle; next use a larger cathode upon the jugular, the thyroid, and the cardiac region for about ten or twelve minutes. This treatment should be carried out every second day for weeks or months.

Brine or Nauheim baths may also be used with advantage, and probably too massage, although the latter should be gentle at first and discontinued at once if not well borne. Cool bathing or sponging, at a different time of day from that at which the brine baths are taken, may be helpful. An ice-bag or cold compress over the heart sometimes subdues the tachycardia.

The rationale of all measures recommended other than antitoxic must be that they are such as maintain the healthful functions of the organism, while the organism itself by its excretory apparatus is casting out the toxic agent which causes the symptoms of the disease. The operative treatment by removing the offending organ eliminates the immediate cause and the antitoxic treatment when discovered will counteract it. Elimination is sometimes further increased by diarrhea. Hence caution should be observed in repressing diarrhea.

In estimating the value of operative treatment, it must not be forgotten that a certain number of patients die of the effects of the operation who would probably have lived sometime longer, although not cured of the disease. Some 14 per cent., it is said, perish of the operation.

Blepharorrhaphy is sometimes necessary to retain the eye in position. A remarkable case requiring this was in my wards at the Pennsylvania Hospital last fall, not however, a case of Graves's disease. The eye protruded farther and farther until it actually dropped outside the orbit. It was returned by my colleague Dr. Harlan and retained in place by sewing the edges of the lids together. It was first thought that there was a post-ocular tumor pressing the eye out, but this proved erroneous. The patient, a woman, was discharged a couple of months later and the edge of the eyelid separated. Only a few days before this patient came under my care I had heard that the eye of a pug dog dropped out of its socket, but I never expected to see a human being in whom this occurred. It is said also to occur in certain purpuric states.

THE TREATMENT OF GASTROPTOSIS

BY ALBERT PHILIP FRANCINE, A.M., M.D.

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OF all the chronic ailments for which patients come for treatment to the physician, very few offer a better opportunity for the relief of symptoms, and consequently a more satisfactory field for credit in practice, than do cases of gastroptosis. I make this statement at the outset because I think that many practitioners take quite a gloomy view of these patients. On the contrary, it is often possible to restore them from a condition of passive misery and distress, to one of comparative health and well being. I say "comparative" health, for while one can relieve the distressing symptoms and cause a great gain in health and strength, so as to change in many instances the whole course of their lives, yet one can rarely so far as I have been able to observe "cure" the condition in the sense of causing the stomach and kidney to return to and occupy permanently their normal position. In other words, one can relieve the symptom-complex known as gastroptosis, without restoring the organism to its normal condition anatomically.

In this connection it should be borne in mind that ptosis of the stomach and kidney does not always cause symptoms. In the routine examination of patients, particularly in hospital practice, one will often find women in whom the right kidney is freely palpable and the stomach ptosed an inch or two below the umbilicus, and yet they show no symptoms directly or even indirectly referable to this condition—not ignoring the fact that gastroptosis is rightly held accountable for many vague general neurasthenic symptoms.

Before proceeding directly to the treatment, I should like to define, as briefly as may be, what I conceive gastroptosis to be. Gastroptosis is a symptom-complex, consisting in the downward dis-

placement and dilatation of the pyloric end of the stomach, the downward displacement of the transverse colon and hepatic flexure, and movable right kidney—associated with local gastric and general neurasthenic symptoms. Sometimes too the liver is movable or displaced slightly downward, the spleen rarely; and very often in multiparous women there is marked diastasis of the recti muscles. Uterine displacements are also common. Any or all the above, are part of a general tendency toward visceroptosis. There are other clinical and anatomic features of gastroptosis, but it is not necessary to refer to them here.¹

The local gastric symptoms arise as a rule from motor insufficiency and perverted glandular function, while the neurasthenic symptoms may be said in a general way to be due to the displacement of the viscera. Both sets of conditions, however, act and react in a vicious circle, but the motor aspect of these cases is more important than the chemical.

The indications for treatment are then: (1) To increase the motor power of the stomach, and relieve the stagnation and consequent fermentation of the gastric contents; (2) to furnish support to the abdominal viscera and hold them, so far as may be, in their normal position, thus relieving local congestion and symptoms of weight and dragging; and (3) to tone up the general health and mental attitude of the patient.

The measure which I want to mention first, both on account of its importance diagnostically and its therapeutic effect, is gastric lavage. It is quite impossible to proceed on a scientific or even rational basis, unless one is familiar with the motor power and glandular activity of the stomach. In those cases in which there is retention of the gastric contents lavage is indispensable in relieving the stomach of the fermenting residue, while even in those cases in which lack of motor power cannot be demonstrated, it seems to do good. For its effect is not only apparent in a sense of relief upon the part of the patient, but it is directly stimulating and tonic in its action on the gastric mucosa. Nor is it devoid of a potent and stimulating mental influence in these patients, and as any

¹ For a complete discussion of this subject see "Gastroptosis, a Critical and Clinical Study, with References to 100 Cases." Univ. of Pa. Med. Bull., January 1908, by author.

one knows who has treated many of them, the neurasthenia is no small part of the picture.

For the purposes of diagnosis an Ewald test breakfast may be given in the morning on a fasting stomach and removed by aspiration with a bulb one hour later. One should not be satisfied with a single analysis, but should thoroughly convince oneself to what extent the motor power and glandular activity of the stomach are impaired. I think for the purposes of treatment lavage should not as a rule be practiced oftener than every other day (though it is harmless). When there is much motor insufficiency and retention of large amounts of mucus, it may be done daily with the greatest benefit. Theoretically it is perhaps better to wash out the stomach in the evening before retiring, or on rising, before breakfast; but practically this is often impossible, so that an hour or two before the midday meal is usually chosen. It is the practice of some to use medicated solutions for lavage. The idea seems a rational one, though for routine practice warm water seems to answer every purpose.

In the treatment of gastropotosis in which motor insufficiency is apt to play so large a part, it is absolutely imperative that the patient should eat slowly and moderately and masticate the food properly. By masticating properly I mean thorough disintegration and insalivation of the food. I think that in the average cases, with the exception of admittedly indigestible foods, and much fats or starches (which of course should be limited), there need not be much selection in the diet. To use the (unfortunately) hackneyed terms, it should consist of light, easily assimilable, and nourishing food. The important point is that too much should not be eaten at any one time, the stomach should not be overloaded and taxed—as its effectiveness, its motility, is already impaired, and the food should be received into it in as suitable a state for digestion and assimilation as possible. This can be accomplished and will inevitably result *only* if the patient chews carefully and systematically every mouthful of food and renders it thoroughly alkaline and saturated with the saliva. From cultivating this habit, he will soon find that he eats much less than he ordinarily would, that his appetite is readily satisfied, and that he is infinitely more comfortable after eating. I should like to quote in this relation a

paragraph from Dr. Billings' paper on "Diet and Nutrition,"² which expresses well my views:

"Those who have found it necessary to lavage the stomach of patients have noticed the very common want of a thorough division of the food by mastication, as shown in the large particles of food of all kinds which are found in the stomach of the average individual. This entails an enormously increased work on the digestive organs and one of the salutary lessons of the stomach tube to the patient is to show him the evils of insufficient mastication. That mastication should be carried out to the degree and for the purpose advised by Mr. Fletcher and Dr. van Someren is a question which time must solve. We are too apt to be faddists in many ways, but if the gentlemen named shall influence the observance of the physiologic law of thorough mastication of the food they will have accomplished much good."

Sometimes when there is hyperchlorhydria the appetite may be large and it is particularly in such instances that the above advice applies, when there is a strong tendency to overload the stomach. It is of importance to put as little work or strain upon the impaired gastric function as possible, to give the stomach a rest, as it were, and allow it an opportunity to recover its lost compensation.

Applying this same principle, it follows that the patient who has no appetite should wait for one. Let him starve himself a little if necessary. It is the appearance of appetite and its psychologic stimulation of the gastric glands which prepares the stomach for the reception of food (Pawlow). I feel that the no-breakfast plan is not a bad one, if it is limited to mean waiting for an appetite. When the desire for food comes, eat slowly and thoroughly insalivate every mouthful.

In relation to diet, however, a word should be said about those cases in which there is an excessive hyperchlorhydria or a marked reduction or absence of HCl. In these cases it is advisable to attempt something more by the diet than mere sustenance. It should so far as possible be adapted to the functional disorder of the gastric glands and without attempting to elaborate this phase of the sub-

² Recent Advances in the Physiology of Human Nutrition. By Frank Billings, M.D., Jour. Amer. Med. Assoc., November 4, 1905.

ject at all adequately, it may in a general way be stated that in hyperchlorhydria, the carbohydrates and fats are more suitable than proteid food, because the latter stimulates actively the acid glands. Whereas in hypochlorhydria or anchlorhydria the diet should be chosen so far as may be with the object of stimulating this secretion, and here the animal broths and other proteid foods will have that effect.

Of equal importance with lavage and mastication, is mechanical support. These patients need a suitably fitted belt to help bear the burden of the visceroptosis. As instanced above, the most important feature of these cases is the motor insufficiency; the deranged glandular function while not to be neglected, should be recognized as of secondary importance. The vital thing is to enable the stomach to pass on the food to the intestine in normal time, and while Pawlow has shown the rôle played by both gastric and duodenal secretion in the action of the pyloric sphincter, yet the underlying feature is the motor, rather than the chemical aspect. The belt is not, in my opinion, applied with the idea of completely replacing the stomach to its normal position, but of supporting it. Some will not agree with me but I feel convinced from frequent examination of patients who have worn belts for sometime and been entirely relieved of symptoms, that the stomach never completely returns to its normal position. I think the kidney is more often replaced by a suitably adjusted belt and pad, than the stomach. Furthermore it is not necessary for the relief of symptoms as instanced above that the stomach should be absolutely restored to its normal position, as often and often in the (hundred) cases referred to above, the patient on wearing a belt was relieved of the symptoms of dragging, weight, backache, and fatigue, but the stomach while somewhat elevated by the belt still remained as much as an inch or two below the umbilicus. The belt acts, I think, by taking the strain or tension off the ligaments, nerves, blood-vessels, and soft tissues, and in this way, aside from the direct relief of the traumatism, permits of the restoration of freer circulation. The belt thus relieves splanchnic congestion, and also the drag and strain on the tissues themselves. It also results in the reduction of the pyloric dilatation. It should be fitted with perineal straps and carefully adjusted. Sometimes it is well to place a small pad in

such a position as to hold the kidney in place, though I have found that very often pads render the patient uncomfortable and do not seem to accomplish much. A properly fitted belt, giving even and firm support, answers every purpose.

The best of all abdominal supports, however, are the abdominal muscles. These are unfortunately apt to be weak in the subjects of gastroptosis, either from diastasis of the recti muscles or other causes. They should be strengthened and their nutrition improved by suitable exercises and massage, and made to fulfill so far as possible their normal function.

Stockton ³ says:

"The motor power may be assisted by certain mechanical measures, especially by really skilful massage over the region of the stomach, by trunk rotation and flexion, by the alternate hot and cold douche over the epigastrium, and by external and internal faradization. The alternate hot and cold douching through the stomach tube has seemed sometimes to do good."

In this connection, constipation, which is very common in these cases, should be relieved as far as possible without the use of laxative drugs. Massage of the belly wall and electricity, and regulated exercise directed to strengthening the abdominal muscles and back are very important in those of costive habit. A glass or two of water should be taken on rising and this will sometimes suffice to keep the bowels regular, in conjunction with the improved hygiene and diet. If this is not the case, recourse should be had to a daily enema of warm water.

If drugs are used for this purpose, the best I think are cascara and the salts. Cascara is well taken in severe cases of constipation in divided doses, ten or fifteen minims freely diluted with water being prescribed after meals and at bedtime. The salts as usual should be taken on an empty stomach on rising.

It is well for these patients to lie down after the midday meal. They should rest, for at least an hour, on the flat of the back, with waistband loosened and corsets off. In the more severe grades it is often necessary to prescribe a modified rest-cure, with a period of rest after each meal.

³ Food Stagnation from all Causes. Jour. Amer. Med. Assoc., November 4, 1905.

Badly fitting corsets or tight waistbands or belts should be given up, and the clothes supported by shoulder straps. Great care should be directed to seeing that the corset in women does not do more harm than good. Many of these patients after getting a well fitting belt can give up the use of the corset. Sometimes (in men) a leather belt is the cause of, or a factor in, gastroptosis; and in these patients the trousers should be supported by suspenders.

The general management of these cases is so important that I have placed it first and gone into it at some length. It remains to consider the medicinal measures. A few drugs, of which there are many combinations, are useful in restoring the gastric compensation, motor and secretory, which is lost in gastroptosis. There is great skill possible in the exhibition and selection of drugs in these cases and the choice depends not so much on the symptoms as it does on the condition of the gastric glands and the musculature, as determined by the stomach tube.

When pyrosis and flatulence are due to stagnation of contents and acid stomach, carbolic acid, creasote, and resorcin act particularly well. It is impossible to outline even briefly the various gastric phases which would lead to a selection of one or another particular drug, and I will simply submit a few prescriptions which I have found very serviceable.

R	Tincture of nux vomica		
	Resorcin, of each,	2 drams	8 | 00
	Compound tincture of cinchona,	3 ounces	100 | 00
	Mix. Sig. One teaspoonful (5 c.c.) after meals.		

R	Carbolic acid,	6 minims	0 | 40
	Sodium bicarbonate,	2 drams	8 | 00
	Aromatic spirit of ammonia,	4 drams	16 | 00
	Spirit of chloroform,	2 drams	8 | 00
	Peppermint water, to make,	3 ounces	100 | 00
	Mix. Sig. One teaspoonful after meals and at bedtime.		

R	Creasote (beechwood),	6 grains	0 | 40
	Sodium bicarbonate,	2 drams	8 | 00
	Powdered acacia		
	Sugar, of each, sufficient.		
	Compound spirit of lavender,	3 drams	12 | 00
	Water, sufficient to make,	3 ounces	100 | 00
	Mix. Sig. One teaspoonful after meals. (Pepper.)		

I have found the following particularly useful when there is flatulence and constipation, with delayed motility and subacidity:

R	Carbolic acid,	30 grains	2	00
	Milk of magnesia,			
	Green peppermint water,			
	Of each, sufficient to make,	8 ounces	100	00
Mix.	Sig. One teaspoonful in a glassful of hot water before meals and at bedtime.			

When there is marked hyperacidity, it has long been customary to use silver nitrate alone or in combination with belladonna. The following pill is serviceable:

R	Silver nitrate,	$\frac{1}{2}$ grain	0	015
	Extract of belladonna,	$\frac{1}{8}$ grain	0	008
	Mix and make one pill.			
	Sig. One such pill to be taken three times a day.			

In cases of subacidity or anchlorhydria, it is customary to use hydrochloric acid. This is a very useful drug and may be prescribed alone or in combination, as suggested below. When given alone fifteen to twenty minims (1 to 1.25 c.c.) of the diluted acid may be given well diluted with water. The following is a good combination:

R	Diluted hydrochloric acid,			
	Diluted phosphoric acid,			
	Pepsin (pure or in scales), of each,	4 drams	16	00
	Compound tincture of cardamoms, sufficient to make,	6 ounces	200	00
Mix.	Sig. One teaspoonful in water, after meals.			

For nausea or vomiting, which depends as a rule on gastric irritability, stagnation, and yeast fermentation, lavage is the best remedy, though any of the drugs usually employed for the relief of these symptoms may be used. Stockton speaks highly of salicylic acid. The following answers the purpose well:

R	Bismuth salicylate.			
	Pepsin, of each,	2 drams	8	00
	Cocain hydrochlorate,	1 grain	0	06
	Cinnamon water,	3 ounces	100	00
Mix.	Sig. One teaspoonful every two hours.			

In the treatment of gastroptosis, as elsewhere in medicine in relation to chronic conditions, general hygienic rules are important. A daily morning bath, either sponge or tub, should be taken and the skin kept in good condition by thorough friction with a rough towel. These patients should sleep with their windows wide open and be out in the air as much as possible, but without tiring themselves. Long walks and particularly shopping tours are distinctly contraindicated, but the patient should get as much fresh air as possible. A glass of some tonic wine, as for instance, extract of malt, or sherry, or beef, iron and wine, is a good thing with the meals and helps the gastric function. Many patients with gastroptosis are thin and weak, either naturally or from being run down, and when they begin to improve they should be fattened up. They should be encouraged to take milk, and raw eggs, and under this line of treatment with a large amount of rest, regulated exercise, and a maximum of fresh air, it is no surprising thing to have them gain ten or fifteen pounds, and be entirely relieved of symptoms.

Finally, operation may be suggested. The operation for this condition is termed "gastropexy." Duret,⁴ of Lille, was the first to operate for this condition (March 14, 1894), his operation consisting in a fixation of the serosa of the lesser curvature of the stomach to the parietal peritoneum and muscular abdominal wall at a point just below the xiphoid cartilage. Similar operations have been performed by Davis, in 1897, Rovesing, in 1899, Hartmann, in 1899, and Coffey, in 1902.

Beyea, of Philadelphia, in 1898, elevated the stomach to its normal position by plicating the gastrohepatic and gastrophrenic ligaments. Bier, of Greiswald, in 1900, operated with practically the same technic. Webster, of Chicago, in 1901, advised and practiced the resection and suture of the fascia of the recti muscles in those cases of enteroptosis and gastroptosis associated with diastasis of the recti abdominalis. It would seem that Beyea's operation supplemented, as he suggests, by Webster's operation, when the latter is indicated, is physiologically and surgically the most rational. The subsequent history of the patients operated upon seems to show that their symptoms, both gastric and neuras-

⁴ *Revue de Chirurgie*, vol. xvi., 1896.

thenic, have been permanently relieved, they have gained in weight, and the stomach has remained approximately in its normal position.

However, I would hesitate before recommending such radical measures in cases which so frequently yield to hygienic, dietetic, and medicinal measures. In the ordinary run of cases, operation is not to be considered; while in the more unyielding cases resourcefulness and patience on the part of the physician, seconded by persistent effort on the part of the patient, will frequently work wonders. That there remains a small third class, however, so bad that nothing but operation will relieve them, and that in such cases operation may be relied upon to do this, seems pretty well established.

COUGHING AND ITS RELATION TO TREATMENT

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THERE is probably no symptom, with the exception of pain, that must be taken as much into account in the treatment of many diseases as cough, and there is none of which the treatment is more variable. Cough is the most obtrusive, as well as one of the most diagnostic, manifestations of the diseases of the respiratory organs, for it is present in all of them, from an acute laryngitis to tuberculosis of the lungs. In all of these affections, however, it signifies the presence of something to be removed from the respiratory passages, or some condition that produces the sensation of a foreign body within the tubes—something to be removed when there is an accumulation of mucus, pus, blood, or other products of a pathologic process, the sensation of a foreign body when the irritation is aroused by engorgement, swelling, or edema of the mucous membrane. In these cases the cough is often spoken of as being direct, to distinguish it from the many conditions in which it originates from an irritation at some point more or less remote from the organs of respiration. In a physiologic sense, of course, all cough is reflex when it is not purely a voluntary act. Thus, it is to a great extent voluntary in adults, but for the most part reflex during infancy and childhood, since it occurs in the young only as a response to the irritation that is produced when mucus accumulates in the bronchial tubes or when one of the other forms of irritation just referred to creates the impulse. But, whatever the cause the treatment must be based upon a correct understanding of the case.

In simple, acute bronchitis, which may be taken as the type of cough-yielding ailments, there are usually two indications to be met: (1) The relief of excessive irritation, and (2) the modification of the character of the expectoration. In the beginning, as a

rule, the sputum must be made less tenacious; later it may need to be lessened in quantity. The irritation, when excessive, is reduced by the so-called sedatives, and the expectoration is rendered less viscid by the expectorants. Of the sedatives, opium is the representative, and it is to some extent perhaps a matter of fancy which of the many preparations should be employed; still, there is something more than fancy in the long-sustained preference for paregoric and Dover's powder. Codein, heroin, and the bimeconate of morphin do not produce constipation to so troublesome a degree as do the opium tinctures and most of the salts of morphin, and this is often an important consideration in the selection of a remedy.

As a general rule, the propriety of administering a sedative and the selection of the one most suited to the case is determined by the age and physical condition of the patient, and by the physical signs of the disease. There is ordinarily as great danger of our overtreating the patient medicinally as of neglecting to give proper care. The important lesson to be learned, by the young physician at least, is how to avoid doing harm. The first rule should be never to use opium or its preparations to allay a cough for a patient in either extreme of age; for, in the very old or the very young, a mild catarrh limited to the larger bronchial tubes may extend within a few hours to the smallest tubes. Nevertheless, as an exception to this rule, the best authorities admit the propriety of administering opium to an infant when it is clearly evident that the cough is producing damage that cannot be prevented by means of less dangerous sedatives,—a condition that is hardly conceivable. Opium should never be included in the first prescription, at least, or at any stage in the presence of fever. In such cases one of the bromide salts, preferably that of ammonium, or sodium, may be employed; but even these remedies must be used with discretion, especially when fine moist râles are heard, indicating involvement of the smaller tubes, with liability to bronchopneumonia. And what is thus true of infants is applicable also to persons of advanced age. In robust adults, too, the cough irritation can often be sufficiently allayed by means of the bromides; or the compound spirit of sulphuric ether or a little chloroform may be added to the prescription. Chloral is more powerful as a sedative, but it is for the same

reason more dangerous. Infants and young children are generally quieted by proper doses of phenacetin ($\frac{1}{2}$ to 2 grains, 0.03 to 0.13 gram), at intervals of four to six hours.

Opinions differ a good deal with regard to the employment of opium and other sedatives in the treatment of pneumonia. Some writers believe that the cough is beneficial to such an extent that it should not be suppressed, and the view is undoubtedly correct in many cases. But, when we reflect that in an uncomplicated pneumonia only an insignificant part of the exudation is removed from the lungs through the bronchial tubes, it seems that the cough is of little service, and that it is the better plan to hold it in check; for a constant jarring of the solidified lung by a useless cough is productive of no good and the patient needs rest. On the other hand, the cough often depends almost entirely upon an accompanying bronchitis, a fact that is shown by the quantity of the sputum and its mucous character. When the expectoration is abundant, sedatives must be used cautiously or not at all. The extremely viscid sputum that clings to the tongue and lips calls for expectorants such as ammonium chloride or carbonate, and not for opium.

In bronchopneumonia the conditions are somewhat different, for, although very little of the cellular débris from the air vesicles passes out through the tubes, arrest of the cough favors increased accumulation and the involvement of additional alveoli. The cough serves a beneficent purpose and if remedies are employed to modify it, they must be used with great caution. And, when such necessity arises, the remedy should be given in small doses, at short intervals, if need be, but never by hypodermic injection. Even the most urgent need of sleep should never lead us into the error of putting the patient into a stupor so deep as entirely to suppress the response to bronchial irritation.

The expectorant drugs, of which ammonium chloride, ipecac, and squill are representative, are also indirectly sedative in effect, for through their making the phlegm less tenacious, they diminish the irritation and delay the impulse to cough. They are most useful in the early, so-called dry, stage of the catarrh, and whenever it is desired to increase the secretion of mucus because the cough is unproductive of it. After the secretion has become sufficiently abundant, and later, after it has gone through the classical change

from mucous to muco-purulent and as the irritation subsides, something should generally be given to reduce the quantity. For this purpose, such mildly astringent expectorants as senega and wild cherry are well suited. Some physicians prefer to employ one of the preparations of tar, or, more especially in chronic bronchitis, the oil of eucalyptus or of sandal, the oleo-resin of cubebs or of copaiba, turpentine, terebene, or terpin hydrate; but digestion is often disturbed by these. Aromatic sulphuric acid has been highly recommended for the same purpose. Belladonna or atropin may be employed, and when coryza is also present it has the further advantage of checking this secretion. The iodides are useful more particularly for the repair of the damage to the bronchial mucous membrane and when the condition has become chronic. For administration to children there is perhaps no better preparation than the syrup of the iodide of iron. It is especially indicated when there is enlargement of the cervical lymph nodes or bronchial glands in strumous subjects. Most of us, no doubt, have seen children affected with early tuberculosis entirely recover under the use of this remedy, with the aid of proper food, outdoor life, and other hygienic measures.

Tartar emetic, squill, and cimicifuga are also excellent expectorants, when correctly used, and probably they are employed less than they should be, especially in cases that are becoming chronic. Apomorphin sometimes affords an agreeable change and it is especially useful when the expectoration is viscid. Administered in syrup of lemon, with a few drops of hydrochloric acid to preserve the solution, it is free from the usual cough-syrup qualities of odor and taste.

Most expectorant drugs are nauseating and excessive dosage must be avoided, but the administration of an emetic is often of the utmost service in clearing out the tubes of a debilitated patient, in whom weakness, age, or dulling of nervous excitability from any cause prevents the coughing, or renders it ineffective.

The management of coughing in tuberculosis of the lungs depends to a great extent upon the stage of the disease and many other conditions. In the beginning, when the infiltration of the apex causes a useless harassing irritation, to disregard it is cruel, but opium must be employed sparingly, no less on account of its

possibly harmful effect on the disease than for its disturbance of digestion, arrest of intestinal peristalsis, and consequently impairment of nutrition. When possible, it should be omitted altogether as long as there is hope of recovery. The creosote treatment is palliative of the cough, as a rule, although there is often a period during the administration of the creosote, when the bronchial secretion becomes scant, and the cough becomes more annoying to the patient, because it is unproductive. At this time, a sedative may be beneficial. Later in the disease, little is generally required, for the irritation is not excessive and the expectoration must be removed. The patient may be taught to suppress the cough, however, and his experience of the benefit thus obtained generally perpetuates the practice. When, however, the cough becomes paroxysmal or otherwise troublesome, as a result of irritation at a place that is inaccessible for local treatment, particularly in advanced phthisis, codein, heroin, or morphin should not be withheld. The throat should always be examined in these cases for the source of the irritation.

In the coughing of bronchiectasis, fetid bronchitis, and the mixed infection of late tuberculosis, I have found that much good can be accomplished by the administration of calcium sulphide in one grain (0.06 gram) doses three or four times a day. When the remedy is given an hour or longer after meals, unpleasant eructations are avoided. The sputum is reduced in quantity as the streptococci and staphylococci are destroyed, and there are no evil effects to compare with those that occasionally follow the injection of antistreptococcic serum. The cough is not usually troublesome after the character of the sputum has been thus corrected. The durability of the result depends, like that of the serum treatment, chiefly upon the freedom of the patient from exposure to reinfection by these germs. In the pure, clear atmosphere of southern California, the sputum may remain free from pus, or nearly so, for several months after it has been thoroughly rid of the micrococci, but where the atmosphere is contaminated with them, the effect is less enduring.

Little need be said of the cough in such thoracic affections as aneurism and mediastinal tumors or abscesses, since the necessity of giving or withholding drugs for its relief is seldom a matter of

doubt after the disease has been correctly diagnosticated. In an unavoidably fatal case, of course, the comfort of the patient assumes first importance. Foreign bodies and tumors within the bronchial tubes, or causing pressure upon them or upon the trachea, create a cough of the most distressing kind, but the inhalation of sprays containing menthol and camphor or cocain very often gives as much relief as the administration of drugs, short of producing narcosis.

In emphysema, the irritation is due chiefly to the associated bronchitis, sometimes in part, perhaps, to the pressure on the apex. Strapping the chest sufficiently relieves the cough in most cases of pleurisy, but opiates must sometimes be given, although they generally seem to prolong the attack. The cough that is caused by engorgement of the lungs in valvular diseases of the heart promptly subsides, as a rule, when compensation has been fully restored. That due to hypostatic congestion in bedridden patients, especially in those debilitated by age, is easily made fatal by the administration of soothing or depressing cough medicines. Such remedies as ammonium carbonate, or the aromatic spirit of ammonium, digitalis, and strychnin are usually indicated, along with inhalations of oxygen or turpentine, to stimulate the cough and promote expectoration.

If an estimate could be made of all the cases in which the patient consults his physician on account of cough, I believe that it would show that in a majority of them, the irritation is situated in the upper respiratory passages, however positive the patient may be that the soreness is lower down. Here the conditions are so variable that the treatment often requires the skill of the specialist, for the removal of adenoids, enlarged tonsils, elongated uvula, enlarged turbinal bones, papillomas, polyps, and other growths in the larynx, on the epiglottis, pharynx, or in the posterior nasal chambers; or for the treatment of catarrhal conditions. The epiglottis is extremely sensitive and a paroxysm of coughing is immediately induced by anything that irritates its posterior surface. It is in this way that the uvula gives offense when it is elongated, edematous, or abnormally dependent on account of relaxation of the palate. Mucus dropping down from the nasopharynx acts in the same manner. Sometimes the posterior pillars

become so much swollen as to come into contact with the epiglottis, and the enlargement of veins or glands, including the so-called lingual tonsil, is occasionally a source of similar irritation. In the few cases of retropharyngeal abscess in my experience, coughing was not a perturbing symptom, and opening the abscess terminated the condition; but in a case in which spontaneous opening was threatened, as in one case in which the parents refused to permit cutting, the benumbing of the cough reflex by opium, however much it seemed to be needed, would favor the passage of the pus into the larynx during sleep.

Pharyngitis is a common cause of coughing, but a great deal depends upon the region affected. The posterior wall of the pharynx is so nearly devoid of sensitiveness that large granulations, dilated veins and ulcers may exist without causing much disturbance, unless the secretion of mucus is so much increased as to irritate the epiglottis. But the lateral walls, just back of the posterior pillars, are exquisitely sensitive when they become inflamed or when granulations have formed upon them. This is often the region affected in the so-called clergyman's sore throat, and many tuberculous patients cough day and night on account of an overlooked inflammation of this region. The passage of a hard or rough morsel of food or the lodgment of a crumb of bread, a grain of salt, pepper, or spice, throws the patient into a fit of coughing equal to that produced by their entering the larynx, an accident to which it is generally attributed. Hypertrophic inflammation of this region was described fully thirty years ago by S. Solis-Cohen under the name, pharyngitis lateralis hypertrophica, but it has been seldom referred to by subsequent writers, and its existence has been denied by a few of these. The text-books refer to it only briefly, many of them not at all. Dr. Fred Baker,¹ however, describes not only the local manifestations and the harassing cough, but some very remarkable reflex conditions which he has observed as a result of the irritation of these "lateral bands," as he denominates the region. He says that "Pharyngitis lateralis hypertrophica is as often described under the general term pharyngitis hyptrophica as any other, and some authors in describing the disease omit all specific mention of the lateral bands. . . . While a general inflammation of

¹Annals of Otol., Rhinol. and Laryngol., August, 1902.

all the throat tissues is not uncommon, I have frequently seen an inflammation entirely localized in the lateral bands, and yielding so promptly to treatment directed only to them, that I believe they are as truly circumscribed as the tonsils themselves. And here is the commonest source of error in the consideration of the pathology of the disease. The lymphoid masses on the posterior median surface of the pharynx are absolutely distinct from the lateral bands, yet it has been common to describe as granular pharynx any perceptible thickening of either or both groups of tissues, thus covering two distinct pathological conditions with extremely different symptoms. Indeed the subjective symptoms of simple chronic granulations of the posterior pharyngeal wall between the lateral bands are almost absolutely nil, while inflammation of the lateral bands is often one of the most distressing conditions with which we ever have to deal." Baker recommends the application of a 10 or 20 per cent. solution of chromic acid, occasionally a 40 per cent. solution, and he does not find it necessary to employ more active cauterization. A few treatments as a rule effect a lasting cure.

Another prolific source of irritation is sometimes found in the posterior nares, more particularly at the lower posterior margin of the nasal chambers, where the hyperemia is maintained by the almost constant covering of mucus, and slight ulceration sometimes forms. The cough is distressing and apparently causeless, until its source has been discovered. Relief is promptly afforded by the application of a silver nitrate solution on a pledget of cotton passed back through the nose.

Temporary amelioration of all these throat coughs is effected by sprays containing menthol or by the vapor of hot water to which has been added paregoric, eucalyptol, benzoin, or turpentine. The oleate of morphin may be applied by inunction over the larynx when it is affected, and a cold compress to the front of the neck is soothing. Ice-cream and ices are exceedingly gratifying to the patient. Various confections and lozenges containing peppermint, cubebs, and astringents help to satisfy the longing for relief in a troublesome case. Cocain should be employed with caution, if at all, and always without the patient's knowledge of it. Laryngeal affections should almost always receive the attention of a specialist, but the cough is so troublesome and so harmful in most cases that it

must be relieved without delay, and Dover's powder is one of the most effective remedies, after sprays and vapors have failed.

The cough of asthma, whether the disease be purely bronchial or symptomatic, is that of the attendant bronchitis. Although morphin is the most effective of all remedies for relief of the asthmatic paroxysm in a robust patient, it is never employed solely for the cough. The iodides are usually the most desirable remedy, beneficial also to the underlying disease. The nose and throat should always be examined for a possible source of irritation in these cases.

In whooping-cough the treatment is that of the infection. The remedies are legion and cannot be reviewed in this connection. In many cases sedatives, particularly the bromides, and various inhalants exert a beneficial influence. Personal experience with the old quinin and belladonna treatment, the latter pushed to its physiologic limit, has led me to continue its use. Better than medicine, however, is outdoor life during the daytime, in the country or at the seashore if possible, and open windows at night. The bronchitis must be treated with as much care as in a primary case affecting the smaller tubes.

An interesting source of reflex coughing is the presence of a foreign body, inspissated wax, a tumor, or indeed, any inflammatory condition in any part of the auditory apparatus. The sensation is usually reflected to the throat and the cough is exasperating. The only permanent relief is obtained from removal of the irritation.

Of many other sources of reflex coughing one might well doubt the existence, were it not for the indisputable authority upon which their existence rests. And notwithstanding this authority, a diagnosis of stomach, liver, kidney, or other abdominal cough is never made until, by careful examination, all other possible sources have been excluded. This is true particularly of the renal and pelvic organs. The asthmatic patient often experiences relief from a short, aggravating cough after the eructation of gas, and some of these patients take peppermint, or Hoffman's anodyne, for the purpose of inducing eructation, but such experience does not demonstrate that the stomach is the seat of irritation and the cough a "stomach-cough." As a rule, the diminution of abdominal tension by the eructation relieves pulmonary engorgement and the cough ceases. The cough of the alcoholic is rarely or never due to his

cirrhotic liver, but to the passive congestion of his respiratory organs; perhaps most frequently to the catarrhal condition of the throat that has been induced by tobacco, if not by alcohol. And it is doubtless true that congestion of the abdominal and pelvic organs is as often the result as the cause of persistent coughing, especially in pertussis and tuberculosis.

Nevertheless, proper food and regulation of the bowels are exceedingly important in the treatment of every cough. In this age of overeating and almost universal constipation, the use of laxatives is seldom amiss, and a brisk purge greatly aids in checking an acute bronchitis, while the relief of intestinal engorgement is often followed by decided comfort to the patient in diminishing the cough of chronic pulmonary disease. The food in acute cases should, of course, be less in quantity than in health, but the quality must depend upon the requirements of the system.

The purely neurotic coughs of hysteria and neurasthenia, like the conditions in which they occur, are most appropriately treated without internal medication; and this becomes true of nearly all the other conditions that we have reviewed when the treatment is based upon a recognition of the cause.

THE DECHLORIDATION TREATMENT IN DISEASES OF THE HEART

BY ERNEST BARIÉ, M.D.

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THE first distinction to be made among the numberless persons who suffer from their heart (or who think they do), is that of those affected with real heart disease, and those who are not.

The name of the latter class is legion. Physicians meet at every step patients who insist that their heart is diseased, whereas in reality that organ is absolutely sound. These patients belong almost without exception to one of the following categories: dyspepsia, tobacco poisoning, neurosis, combined frequently with gout, or tuberculosis in the early stage,—a very large group, this one.

When one cross-examines these people they all say the same thing as regards their symptoms, which consist in more or less pain in the precordial region, or in sensations of heaviness, burning, stabbing or constriction; the beats of the heart are painful, and in some cases there are actual signs of pseudo-angina; finally, they complain above all of palpitations, a symptom which is by no means of the value that was at one time attributed to it. Professor Potain was wont to say that any patient who came to you for advice on the score of palpitations and for nothing further, could be considered free from actual heart disease.

The way to take care of these patients,—after assuring oneself through auscultation that they really have no organic heart lesion, is to inquire thoroughly in their digestive process and straighten it out. In four cases out of five this is the seat of the trouble, of which the cardiac symptoms, on which the patient lays so much stress and which alone he is conscious of, are merely a reflex manifestation. The remaining case among the five will very likely prove to be neurotic, and will have to be treated from that direction. Digitalis, which in this category is always useless, does actual harm when the case is one of tuberculosis in the early stage.

True heart cases may be separated into two leading groups: those in which the disorder is of an acute nature, and those in which it is chronic. Cases belonging to the former category (endocarditis and pericarditis) require very close and constant watching on the part of the physician.

Organic disorder of the heart usually runs a very protracted course, and before it reaches its terminal period of asystole the patients may enjoy a relative condition of good health for years. This means that there is first a period during which a heart lesion is present without any disease, the lesion being compensated by means of hypertrophic dilatation of the muscle of the heart, by increased energy of the contractions of the heart muscle, and by a species of peculiar adaptation to the damaged circulatory conditions on the part of the entire system. This may continue for five, ten, twenty or more years, the length of respite depending on individual circumstances, which in turn are governed by questions of hygiene, occupation, diet, etc.

But at length, sooner in one instance, later in another, the strength of the myocardium begins to fall below its task. Its hypertrophy of compensation is followed by passive distention. The tension in the arterial system decreases, while that in the veins increases. This is the beginning of the period of disorder, and is called hyposystole, dyssystole or slight asystole.

It is from this moment that these patients may be said to have actual heart disease. The first symptom to be noted is temporary edema about the ankles, appearing during the latter part of the day, and disappearing under the influence of a night's rest in the horizontal position. The urine becomes scanty in quantity, dark in color, leaves more or less deposits, and later on will be found to contain albumin. On examining the abdominal cavity the liver is likely to be found well below the ribs and sometimes sensitive to touch. But the essential symptom is congestion of the base of the lung, more pronounced on one side than on the other; later on signs of pleuritic effusion will appear, generally on the right side. These phenomena in the respiratory tract usually increase the shortness of breath that has been already felt by the patient, who will probably now begin to cough and expectorate frothy and non-viscid sputum.

But under the influence of proper hygienic measures and of rest the whole of these symptoms may disappear, so much so that the patient may find his condition sufficiently ameliorated to enable him to resume his occupation in life.

This restoration to health, however, is only temporary, and as time goes on a series of hyposystolic periods occurs at more or less close intervals according to the case, due to the gradually lessening cardiac tonicity. As each attack takes place it will be found to be longer than the one that preceded, and on the other hand the period of fair health separating two attacks becomes steadily more brief. In this manner the patient drifts slowly but inexorably toward confirmed asystole, which is the inevitable termination of all organic heart disorders.

This state of asystole is characterized by distention of the cavities of the heart, by paresis of the myocardium, and by cardiac ataxia, or cardioplegia. We then observe venous stasis at the periphery manifesting itself in permanent edema, scanty urine, and visceral congestion (liver, lungs, brain, kidney, uterus), together with effusion in the various serous cavities, particularly in the peritoneum and the pleura. At the same time the pulse is thready and arrhythmic,—the whole condition having also been called cardio-vascular asthenia.

The therapeusis of such a complicated state as this, in which the functions of not one organ but, so to speak, of all are affected, is manifestly not simple, and the indications are various.

The treatment of asystole comprises a series of general means, but you must at the outset well understand that the various remedies used in asystole cannot be applied to each and every patient without distinction. The system of each patient goes through the struggle in its own individual fashion, and its power of reaction will depend naturally on its previous condition of health or disease. An example will show more clearly what I mean by this.

For anatomic and physiologic reasons the lungs are the organs that ought first to be affected in asystole. Now although this holds true in a great many instances there are a certain number of patients whose asystole assumes a different type on account of the existence with them of a previous *locus minoris resistentiæ*. With such patients the asystole appears in a localized or partial

form. Thus an alcoholic man, or one with gall-stones or whose liver has been infected on some previous occasion, will be more apt to develop passive congestion of the liver (hepatic asystole) than in the lungs. It is possible in this way to find edema of the abdominal cavity, early ascites, with the lower limbs dry and the lungs almost so. On the other hand with bronchitic patients the asystole is sure to begin with the lungs and to cling to them with astonishing tenacity.

As far as concerns the pharmaceutic treatment of asystole I have nothing new to bring to your notice. We still rely on the group of drugs that have stood the test of experience,—digitalis, strophanthus, caffein, theobromin, etc.,—and that accomplish all that we can reasonably expect to accomplish in these cases which are hopeless from the outset, namely, to tide the patient over one or more attacks and to stave off the final one for a certain amount of time.

But of late we have acquired an adjuvant means to these different remedies, a means that comes more suitably under the heading of hygiene or diet. I refer to the dechloridation treatment, the suppression in the patient's food of all the sodium chloride possible.

Many of you have no doubt seen this treatment applied in cases of nephritis, and have witnessed the remarkable effect it has in some instances in removing edema. By the suppression or addition of NaCl to such a patient's diet you can often decrease or increase his visible edema absolutely at will; and even when there is no visible edema, you will by using scales find that the patient's weight increases or decreases in the same way. Similar oscillations in volume will be observed in the urine.

Results of the same nature, though possibly less mathematical, can be obtained from the dechloridation treatment of the edema of heart disease, and it is to the manner in which this diet should be instituted that I wish to direct attention.

By suppression of salt in a patient's food is meant the suppression of the salt that we add to it at one moment or another during its process of preparation, for in their natural state most of the articles of food we eat contain so small a quantity of NaCl that for practical purposes its presence can be overlooked.

Meat, for instance, only contains NaCl in the proportion of one per thousand in weight. The ordinary French household bread as prepared for eating contains five to six per thousand, and fine bread eight to ten; now raw flour contains very little chloride, the high rate of the prepared bread is the result of adding salt during the process of panification. It is not difficult, then, to make a species of bread for patients under the dechloridation treatment; all one has to do is to order it specially from the baker, and to get him to understand thoroughly that no salt whatever must be added to the flour from which the bread is made. If for one reason or another this bread does not agree with the patient, or he does not like it, its place can easily be taken by baked potatoes.

The dechloridation diet consists in bread, meat, eggs, vegetables, fruit, and milk. The bread we have just referred to. In meat the chloride is combined principally with potassium, only a small quantity being combined with sodium. This refers to raw meat; boiled meat on the other hand contains no chloride at all, as it has become entirely dissolved in the bouillon. Whence the natural inference that no bouillon at all should be given to patients under this treatment. Meat can be given raw, as to tubercular patients, in quantities of one to two hundred grams, which will be found quite sufficient and in some instances will soon have to be given up on account of the distaste it awakens, or it can be given boiled, seasoned with vinegar, pepper or mustard, or roasted with a little lemon-juice squeezed on it. There is no objection to the use of fresh, unsalted butter.

In dealing with persons for whom the salty taste to food is imperative, and there are many such, a means of giving a salty taste to meat without using NaCl is to sprinkle it with powdered sodium nitrate to the extent of two grams per 24 hours; you will often be obliged to resort to this artifice, particularly when you have kept up this diet for a certain time, as salt is the condiment above all others to which we are accustomed and which keeps up our appetite. But this practice would not be without drawbacks were we not to take the precaution of only adding the sodium nitrate at the moment the meat is to be eaten; since prolonged contact of this salt with meat might transform it into sodium *nitrite*, a toxic substance only used as a drug, and in doses of not more than ten or twenty centigrams

a day, in cases of arterio-sclerosis, or aortic diseases, coronaritis, and of angina pectoris. For sodium *nitrite* is a hypotensor agent of the same order as trinitrin, the judicious administration of which gives excellent results if kept within the dose limits above mentioned.

Fish can also be used in the dechloridation diet in heart disease, but it is well to allow only those caught in fresh water, the flesh of sea fish being relatively salty.

Eggs, whose nutritive coefficient is so high, can be permitted, though of course without salt; in themselves they contain but a small quantity of NaCl.

In the vegetable class one should advise chiefly potatoes and the starchy category in general: beans, peas, chestnuts, etc. An exception must be made in the case of lentils, which contain a considerable quantity of chloride. All sorts of flour, rice, and corn are good; they are very nourishing and contain little NaCl. Rice, for instance, can be eaten boiled and sweetened, as sugar, a diuretic, is not forbidden. Other forms of starch can also be prepared as puddings or desserts with milk and baked; or can be seasoned with vinegar or pepper. Fresh vegetables should consist principally in carrots, leeks, lettuce, etc.

All fruit without exception is allowed, fresh or cooked, preserved, stewed or jellied, but pears and plums are to be preferred as containing the smallest quantity of chloride.

Fresh cheese, with cream and without salt, is allowable, as are also coffee, tea and chocolate.

In the way of liquids water is above criticism, ordinary drinking-water contains not over one ten-thousandth of NaCl, and some mineral water, Evian, Alet, Vittel or Contrexeville, are equally suitable.

Wine is, as a general thing, not very suitable for heart disease. Its richness in chloride varies, in fact is sometimes very low; but it is a stimulant for these patients, and often disturbs their digestion. They appear to be better without it, though sometimes beer agrees with them.

It is desirable that the patients with whom we are dealing should always take a certain quantity of milk per diem. Cow's milk is very poor in chlorides—1.3 to 1.8 per thousand; still a pa-

tient on an absolute milk diet, which gives such good results, absorbs with his three liters of milk, upwards of four grams of NaCl per diem, a fairly large amount. It would seem that a milk diet should be prescribed with less readiness than has been the habit in the past, and that in certain cases it is less advantageous than the dechloridation diet of solid food. In short, a liter of milk per diem, a little wine or beer, and some coffee, is what is best for these patients in the way of liquids.

Now as to daily quantities. In the physiologic condition of rest an adult man should take sufficient food to produce thirty calories per kilogram of weight; when such a person works in a moderate way he will require forty, and fifty if he works vigorously.

In a pathologic condition the patient is often in bed, without appetite and with disordered digestion; their requirements are then naturally less than when in good health.

Here are some tables of diet without chlorides, per 24 hours:

1st. With unsalted bread—

Unsalted bread	500 grams
Raw meat	400 grams
Butter	80 grams
Sugar	100 grams

2d. Without bread—

Potatoes	1,000 grams
Raw meat	400 grams
Butter	80 grams
Sugar	100 grams

	Grams	Calories
8d. Bread prepared without salt	200	460
Meat	200	260
Vegetables	250	200
Butter	50	425
Sugar	40	160
		<u>1,505</u>

From time to time the 200 grams of meat can be replaced by three eggs. An egg weighs between 30 and 35 grams, on an average, and represents 120 calories; this diet can then be completed by 1,000 grams of rice, representing 370 calories.

When these heart patients have nephritis at the same time, their diet should be mainly one of milk and vegetables, and the

patient's condition should be closely followed by calculating the quantity of chlorides eliminated in the urine, and by successive weighing. You will know when the excess of chlorides stored up in the system has been entirely eliminated, when the patient's weight becomes stationary and the chlorides of the urine do not vary.

At that moment, if the patient is not tired of the diet you can continue it a little longer before modifying it; otherwise you begin at once to add to the daily food, increasing gradually, a little bit of salt, watching the possibility of recommencing retention by means of urinary analysis. In this way you can return to a tolerable diet, until the next attack of hyposystole begins.

A diet without chlorides can often be alternated with a milk diet, of which the monotony is frequently a serious obstacle.

THE INDICATIONS FOR, AND THE METHOD OF PERFORMING, VENESECTION

BY JOHN W. WAINWRIGHT, M.D.

of New York City

THE President of the British Medical Association in his address in 1901, said: "There can be no doubt that treatment by bleeding was formerly sadly overdone, but the pendulum has now swung too far in the opposite direction; I have myself seen desperate cases of pulmonary obstruction in which I have advised it, but friends objected, and not one of these cases was saved by the omission." This opinion is undoubtedly shared by a large number of medical practitioners. The abuse of blood-letting was alone responsible for deserting this method of treatment; if it had been used rationally and not to extremes or indiscriminately and promiscuously, it would have still held its proper place in the practice of the physician.

Blood-letting was practised in very ancient times. Hippocrates mentions it in his writings, and even before he lived, it was in constant use as a therapeutic remedy. Galen (130-200 A.D.) practised and defended blood-letting, which had somewhat fallen into disrepute in his day. Chambers thus summarizes Galen's rules for the guidance of the practitioner: "(1) That you are not to treat the disease, but the man; that you are to judge of the propriety, the amount and the necessity of repetition of blood-letting, by the individual symptoms exhibited in each case, and not by the nomenclature. (2) That you are to observe also, the natural constitution of the patient, *e.g.*, the extremes of life, youth and old age, cause blood-letting to be badly borne. Certain races, such as the soft-fleshed Celtic nations, do not stand it. (3) That you also take note of epidemic influences, that is, not to bleed much in dog-days (in Italy) and in moist warm weather, when of course septic poisons are most rife. (4) That you are to take blood vessels which communicate directly with the seat of inflammation. (5) That often,

in spite of apparent or real general debility, it is desirable to take blood, since the benefit to the locally affected part and the consequent benefit to the system compensates for the depletion."

Sydenham (1624-1689) in his *Medical Observations* lays down these rules for blood-letting: "Whenever I have to deal with a patient whose blood is in itself of a weak character (as it is for the most part with children) or deficient in animal spirits (as it is with men in the decline of life, and youths that have long been invalids) I keep my fingers from the lancet. Whenever, on the other hand, the state of the blood is of a different description (such as I find amongst youths of an athletic habit and a sanguine temperament) venesection is my leading remedy. As to quantity, it is my practice to take away just as much blood as I consider will relieve the patient." Sydenham's "Sheet Anchor" in pleurisy was blood-letting, but he was opposed to its employment in gout.

Blood-letting in Great Britain reached its zenith in the time of Cullen, in 1757. He and his no less distinguished colleague, Gregory, practised blood-letting in the Edinburgh Infirmary for almost every disease, and the practice was carried to extreme and absurd lengths. At this time bleeding was the general custom in Europe and in the United States. In France, Bouillaud was one of its most thoroughgoing exponents, but the Italian physicians bled even more copiously than did their French confrères. A case, indeed, is reported in Italy, in which Rason bled a young man of 19 years 17 times, taking away about 222 ounces; the patient was also given enormous doses of tartar emetic and Kermes mineral.

Ogle in the *Harveian Oration*, 1880, refers to the practice of certain doctors in the earlier part of the century: "On a Sunday morning the doctors used to bleed gratis. The patients often to the number of one hundred, were seated on benches round a room, in which troughs were placed to receive the blood. One of the doctors who tied up the arm of each patient, was immediately followed by others who opened the veins." Such a scene is easier conceived than described.

Hughes Bennett (1856-57) was one of the first and most influential medical men to make strenuous objections to blood-letting and from his time venesection fell gradually but surely into disuse.

Dun quotes approvingly the following indications for venesection described by Sir Thomas Watson in 1871: "The condition which cries out for and obtains relief so signal and immediate from phlebotomy, may be described as that of great and often sudden engorgement and distension of the vessels that carry black blood of the systemic veins, of the pulmonary artery, and especially of the right chambers of the heart. In this embarrassed condition of the circulation with so unequal a distribution of blood in the two systems of vessels, it is the veins that require emptying, not the arteries. As the tension of the stretched and almost paralyzed right vessel is lessened, the hollow muscle again becomes capable of contracting and propelling its contents; the clogged lung is set free; the functions of the oppressed brain are eased and retrieved and the balanced play of the heart and lungs restored."

Markham mentions in the Goulstonian Lectures on Blood-Letting, cases of pneumonia and valvular cardiac disease, greatly benefited by judicious blood-letting.

Dun used venesection with success in uremic coma. The idea is not so much that of the relief of mechanical obstruction, but that with the blood a certain amount of poison is thrown out, while at the same time an osmotic flow takes place from the tissues to the blood, preventing an accumulation of toxins in them.

He found cupping of much use in cases of cardiac distress, as in angina pectoris, and in cases of advanced Bright's disease with cardiac complications. He concludes that general blood-letting is not a cure for inflammation, but in certain cases, especially those in which the right side of the heart is overburdened and in danger of failing, it should not be forgotten.

Zacharin, the great Russian authority, was a firm believer in the good effects of venesection in certain classes of maladies. Referring to this he says: "During my student days and my clinical service, blood-letting was practised frequently and unsparingly, so that I had many opportunities to witness its undoubted value, when it could not be replaced in many cases; while in others I also saw great harm caused by it. The errors of the medical practice in those times consisted in this, that it was taught that blood-letting would cure disease-inflammation, considering as an inflammation pneumonia, acute articular rheumatism, etc. Con-

sequently without taking into account the condition of the patient's strength, they resorted not only to one, but to repeated blood-lettings, not curing the disease, but debilitating the patient." Zacharin recommended venesection in certain disturbances of the cerebral circulation, in the presence of evident symptoms of threatening or already occurring cerebral apoplexy, in patients with a chronic nephritis and hypertrophy of the left ventricle, and in some disturbances of the circulation within the chest. He advised local blood-letting in acute pleuropneumonia, acute pleurisy, and in various other conditions in which the taking away of blood would relieve without undue weakening. Raymond concludes that venesection by its depletive and depurgative action is certainly the best method for mechanical disintoxication in all cases which represent a severe blood intoxication. In all severe toxemias or infections, in which the patient's circumstances are desperate, venesection followed by massive saline injections, without renouncing other methods of treatment, is often capable of rendering the greatest service and even of saving life.

Robin at the International Congress in 1900, said that he was convinced that after moderate bleeding of 150 to 250 grams, polyuria is regularly observed, and the excretion of solids is increased. A greater amount of air is taken into the lungs and the proportion of oxygen consumed by the tissues is correspondingly increased.

According to Beaumont Small, the indications for bleeding may be summed up under three heads: "(a) When there is excessive vascular tension; (b) when it is desired to obtain the benefit of its physiological action upon the various tissues and organs; (c) when it is believed that good may result from removing a definite amount of blood, and with it a certain proportion of toxic material from the system." There are a number of conditions in which this procedure is followed by most gratifying results. The list comprises cases of puerperal eclampsia, pulmonary hemorrhage, pulmonary edema, cardiac dyspnea, spasmodic asthma, irregular menstruation accompanied with migraine, cerebral apoplexy, croupous pneumonia, emphysema, hyperemia of the lungs, pleuritis, congestion of the brain and of the liver, aortic aneurysm, and simple anemia. The quantity of blood extracted should vary

from less than an ounce to twelve ounces. While there is no decided objection to employing venesection in the first stage of pneumonia, it is rarely admissible in the judgment of most writers in the second stage. During this stage, the dyspnea and the possible danger of heart-failure demand the utmost care. Dry cups applied to the chest will at least temporarily relieve the dyspnea.

The use of blood-letting is indicated according to Tyson in two periods in croupous pneumonia: in the early stages for the relief of pain and dyspnea, and in the advanced stage where there is engorgement of the right heart, associated with intense dyspnea and general venous stasis. For the relief of pain and dyspnea, blood-letting by the application of wet cups is the most efficient of remedies. Venesection at the arm is less efficient, although it relieves the engorgement as well as the pain. Blood-letting is not indicated in all forms of pneumonia, but is especially serviceable in those cases associated with pleurisy.

In the advanced stage of pneumonia, with engorgement of the right heart and intense dyspnea, respirations 50 or more, labored and short, or lips and face purple, pulse frequent and feeble, blood-letting is of service, more so if used in connection with normal salt solution and oxygen. Oxygen used alone in these conditions is harmful because of a tendency to overload the right heart. When hypodermoclysis, however, is used following blood-letting, the absorption is more rapid. The toxins are diluted and eliminated through the urine and perspiration, the pulse usually improves, its rate diminishing, breathing becomes deeper, less frequent, and less labored.

Marked respiratory embarrassment in hyperemia of the lung may call for interference by venesection. The abstraction of a few ounces of blood is said to relieve the pain of aortic aneurysm and should be tried if milder measures fail. Repeated small venesections for the cure of anemia have been advocated by a number of writers.

A case of cerebral congestion was very much relieved by means of a novel device by Coppinger. The patient, a fat, plethoric woman, was in a condition of stupor, out of which she could be roused with some effort, but only to relapse into sleep again. Coppinger, anxious to spare the friends the horror of seeing blood, conceived

the idea of substituting the aspirator for the lancet. The needle was passed into the external jugular vein, and four ounces of blood withdrawn without any difficulty. The result being satisfactory, he repeated the operation in the course of a half hour, abstracting six ounces more of blood. The patient was speedily relieved, and neither she nor her attendants suspected that she had been bled, until the procedure was subsequently explained to them.

Two methods of blood-letting are advocated, the evacuant method and the revulsion method. The first consists of phlebotomy, leeches, and wet cupping, and is indicated in disturbances of the cerebral circulation and imminent cerebral apoplexy, in apoplexy of the brain with complications of chronic nephritis and hypertrophy of the left ventricle, in disturbances of the pulmonary circulation and stenosis of the left venous opening, in croupous pneumonia, etc. The revulsion method of leeches is indicated in hyperemia of the spinal cord or brain, in hemoptysis without organic lesion, in imperfect portal circulation, and in inflammatory hemorrhoidal tumors (applied to the coccyx). Epistaxis may be controlled in this manner when other measures have failed.

In lumbago dry cupping over the region will often afford immediate relief when other remedies fail. Leeches applied to the coccyx will sometimes relieve the pain and effect a cure. The relief from painful hemorrhoids following the discharge of blood is readily understood; when nature does not afford this relief, it may often be secured by the application of leeches to the coccyx.

In rheumatism relief is afforded by wet or dry cupping, while in spinal meningitis the application of leeches is always followed by relief.

In venous stasis no measure will afford so prompt and permanent relief as will blood-letting, whether in the opening of a vein, the application of wet cups or leeches. The fear of extracting too much blood is not to be so seriously considered, as a more permanent and speedy relief will follow if more is taken than if a lesser amount.

Method of Performing Venesection.—The vein usually selected is the median cephalic at the bend of the elbow, which is further from the brachial artery than the median basilic vein. The external jugular vein and the internal saphenous vein have also been selected,

when from excess of fat, or in the case of children, difficulty is experienced in finding the vein at the bend of the elbow. In order to perform the operation properly, the surgeon requires a lancet, several bandages, a small antiseptic dressing, and a bowl to receive the blood. The area above the site of the vein should be first thoroughly cleansed and rendered aseptic, a few turns of a roller bandage should then be placed around the middle of the arm, tight enough to obstruct the venous circulation, and thus make the veins below become prominent, but not tight enough to interfere with the arterial circulation. Assuring himself that there is no abnormal artery beneath the skin, the surgeon steadies the vein with his fingers, and passes the point of his lancet beneath and incises quickly, making a free skin opening. The blood from the wound flows freely. The amount abstracted is governed by the condition of the pulse and the appearance of the patient. After a sufficient quantity has escaped, the roller bandage is removed, the wound washed with a mild bichloride solution, a pad of gauze applied, and a bandage placed over all. When the operation is performed on the external jugular vein, the vein is rendered prominent by exerting pressure at the outer edge of the sternocleido-mastoid muscle and then incising the vein parallel to its fibers. In the operation on the internal saphena, care should be observed not to wound the accompanying nerve, which lies just posterior to this vein. The brachial artery has been wounded by carelessness in making an incision at the bend of the elbow.

It is best for the patient to be in a sitting or semi-reclining position during the performance of the operation, in order that the operator may judge better as to the effects of the blood-letting.

Medicine

THE DIAGNOSIS AND TREATMENT OF MEMBRANOUS TONSILLITIS

BY LEWIS S. SOMERS, M.D.

Of Philadelphia, Pa.

INASMUCH as a pseudo-membrane may form on the tonsil as the result of various causes, it becomes important that it be differentiated from diphtheria, and for the best interests of the patient and those in contact with him, the exact nature of the condition should be promptly ascertained. Many attempts have been made to obtain a classification of these membranes, from a clinical and a bacteriologic standpoint, but the former is manifestly impossible and, while the latter does not readily lend itself to such a scheme, yet it is the most available and I believe the most satisfactory if used in an arbitrary sense; that is, with but few exceptions, to consider the predominate micro-organism the exciting cause, even though inoculation will often not produce the same membranous condition in the lower animals.

As in similar pathologic changes elsewhere, two varieties of tonsillar membrane may be differentiated: (1) That in which fibrinoplastic material is formed, becomes organized, and may be removed in definite layers or masses; and (2) the croupous, resulting from the activity of various organisms, but not essentially the result of any particular growth and composed of albuminoid material, coagulable and not organized as the former. In addition to these, there is a third variety which may be the cause of serious error and does not take partake in anyway of the nature of the former, namely, the collection around a tonsillar crypt, or covering an ulcer, of mucopus and epithelial débris, which may for a time closely

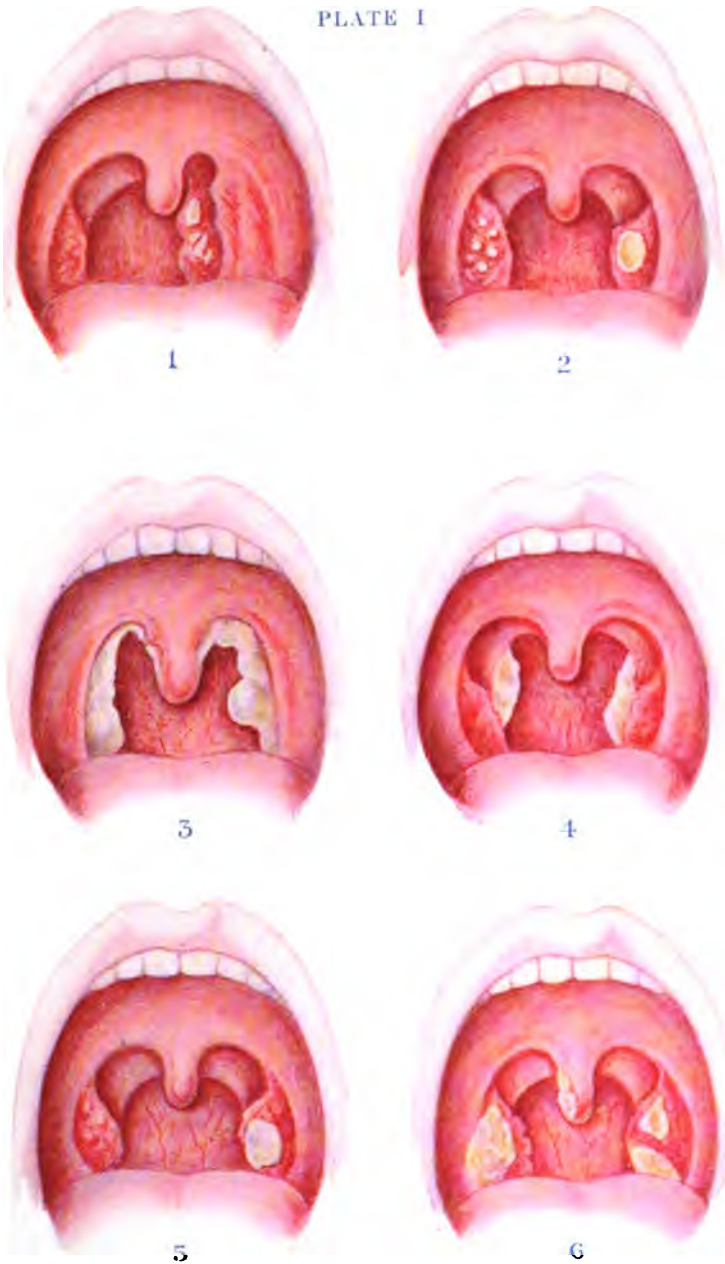
simulate membrane formation,—syphilis especially being liable to cause errors in this respect.

Careful examination in many of these cases will show an enlarged spleen, transient albuminuria, and at times dermal eruptions nonscarlatinal in nature. While these symptoms of a general infection are but slight in intensity, at times they may be of such severity as to overshadow the local changes; and, depending upon the complications that not infrequently ensue, a fatal issue may supervene from what was primarily considered a simple membranous tonsillitis. No special micro-organism seems to be essential to produce such serious results, but the same conditions may exist as the result of a virulent localization of one, or more, of several organisms commonly found in the buccal cavity; and seemingly depending upon the degree of virulence of the organisms, will the resultant symptom group be governed, in some cases being represented by a trivial unilateral tonsillitis with absence of other than slight local symptoms, while in another case with conditions apparently similar, serious local and especially constitutional changes follow in rapid sequence; but the virulence of whatever organism is present seems to bear little or no relation to the presence or absence of membrane formation.

STREPTOCOCCIC TONSILLITIS.—The most frequent of these infections are produced by the streptococcus and the staphylococcus, either alone, or more commonly associated; one or the other predominating, and to that degree influencing the clinical picture. As the result of this combined infection, possessing many titles, much confusion has resulted; and it is described as acute follicular tonsillitis, lacunar tonsillitis, croupous tonsillitis, benign fibrous tonsillitis, and acute catarrhal tonsillitis,—the first being incorrectly applied, since the condition in no way involves the follicles, but is essentially a cryptic affection (Plate I,—1).

In the mixed type caused by these organisms, the membrane first appears as yellowish-white masses slightly projecting from the crypts of the tonsil when the latter is hypertrophied, while, when the tonsils are small and fibrous, the membrane has a tendency to originate under the folds of the faucial pillars and then spread outward upon the tonsillar surface. Most frequently the pseudo-membrane is composed of epithelium, leukocytes, and fatty débris

PLATE I



E. F. Fäber—

The appearance of the throat in the different forms of membranous tonsillitis: 1, Streptococcal tonsillitis; 2, Staphylococcal tonsillitis; 3, Syphilis, mucous patches; 4, Pneumococcal tonsillitis; 5, Vincent's ulcerous-membranous tonsillitis; 6, Diphtheria.

associated with tenacious mucus, so that the similarity to a definite membrane is exceedingly striking; but there is no particular adhesion with the underlying cells and the pseudo-membrane may be removed without a bleeding surface remaining. It is semitranslucent, allowing the color of the tonsil to show through in part, is rather pultaceous, and may communicate with a similar process in the neighboring crypt, so that extensive patches are formed; but the membrane retains its original color until it has completely disappeared, and does not alter in this respect as do some of the other conditions to be described.

From the same cause but probably with some increase of the bacterial virulence, a true croupous membrane may be found in a small number of cases. Usually the tonsillar inflammation is more severe than in the former instance, and destruction of superficial tissue takes place. This again is most intense in and around the crypts, from which points the membrane first makes its appearance. At such places, a fibrinoplastic fluid is formed, which rapidly coagulates, and entangles leukocytes, pus cells, staphylococci and streptococci, so that a superficial necrosis is developed, and when the membrane is removed, erosion and bleeding results as in diphtheria. In whatever form this mixed infection may present itself, at first one tonsil and then the other is affected,—often adding to the diagnostic difficulties, especially when exudation forms on the palate or adjacent parts of the oropharynx.

The subjective symptoms at first closely resemble the acute infectious diseases, especially the exanthemata; there is malaise, chilliness, and rigor, lasting for a few hours or not more than a day at most, and this is followed by a rise of temperature of from three to four degrees. Irritation and some soreness of the throat are then complained of, rapidly followed by the appearance of the membrane on the tonsils. Excessive salivary secretion may then prove annoying; there is slight swelling and tenderness of the cervical glands; and in three or four days, or a week at the longest, the membrane clears up and all the symptoms disappear.

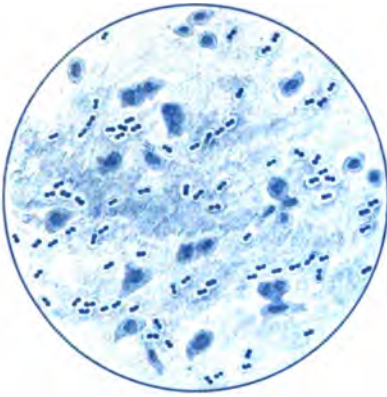
This infection presents variable pictures depending upon the predominance of the streptococci or staphylococci, but as a rule it runs a sthenic course and its variations are those of degree only, being at times so mild that except for slight dysphagia the mem-

brane would not be noticed, while in a much smaller number of cases, it may be so severe, that a fatal termination results from the virulence of the general infection. While this form of tonsillitis may simulate diphtheria and no distinctive clinical features will be found that will aid in the differentiation, yet it is an independent entity and may be differentiated by bacterial examination—which will show the characteristic organisms present (Plate II,—6).

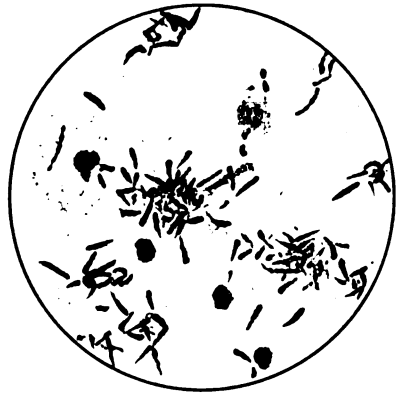
Streptococcic tonsillitis has a greater tendency to spread over adjacent parts, there is inflammation of the pharyngeal mucosa, and the adjacent lymph glands rapidly become enlarged, especially at the angle of the jaw, followed by those of the submaxillary region and often of the cervical triangles. Even in cases in which but little membrane is present, the patient is decidedly influenced by the infection, and in severe instances prostration may be extreme. As the membrane spreads and involves the faucial pillars and the uvula, the cervical glands may suppurate, and transitory erythematous patches may develop on the cutaneous surface, making it resemble scarlet fever; but no desquamation occurs and symptoms characteristic of scarlet fever are absent. The predominate features are the rapid infection of the entire system out of proportion to the local deposit on the tonsils, glandular enlargement, the tendency to infectious changes in other and distant organs, excessive prostration, and pyrexia. The diagnosis from diphtheria is readily made by bacterial culture, but it may be impossible from the clinical symptoms alone, since paralysis of the palate may follow, as in a case seen by Kreschner, in which the tonsils, uvula, and faucial pillars were covered with a false membrane, but cultures showed an absence of the Klebs-Löffler bacillus, and streptococci were obtained from the membrane and the blood. The membrane then disappeared, but was followed by paralysis of the soft palate. Baginsky and Bourges have reported similar cases.

STAPHYLOCOCCIC TONSILLITIS.—Staphylococcic tonsillitis is milder in character than that due to the streptococcus and the membrane is localized, discrete, and shows little or no tendency to extend beyond the confines of the tonsil; it is apt to be limited to a patch covering one or more of the crypts. It begins as an exudate in the crypt, and sore throat while severe at times is usually slight; the general symptoms are of less severity, although at

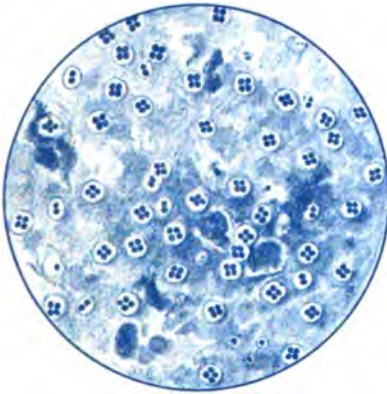
PLATE II.



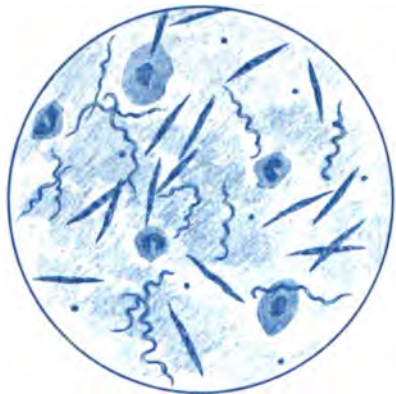
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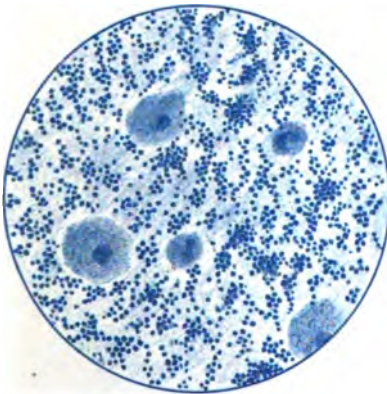
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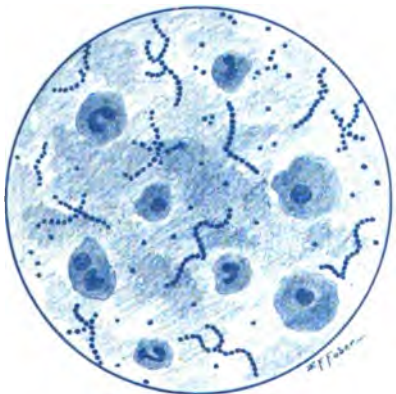
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The micro-organisms concerned in the causation of the different forms of membranous tonsillitis: 1. Pneumococci; 2. Diphtheria bacilli; 3. *Micrococcus tetragenus*; 4. *Fusiform bacillus* and spirillum of Vincent; 5. Staphylococci; 6. Streptococci.

times the temperature may be high and a chill ushers in the onset. The cervical glands are slightly enlarged, there is no suppuration, and but rarely terminal infections in other portions of the body. The membrane is thin and presents the appearance of a gloss over the slightly inflamed tonsil (Plate I,—2). There is considerable mucous discharge, and after this has been washed away, the semi-transparent membrane may be removed without lacerating the mucosa, or causing discomfort to the patient. It is essential, however, that a bacteriologic examination be made in order that diphtheria may be eliminated. The staphylococcus (Plate II,—3) is found as the predominating organism, or more rarely in pure culture.

VINCENT'S ULCERO-MEMBRANOUS TONSILLITIS.—Recently, attention has been directed to a form of tonsillitis which undoubtedly has been mistaken for other conditions somewhat similar in their objective symptoms; this is Vincent's ulcero-membranous angina (Plate I,—5). Under this title can be grouped a number of membranous inflammations involving the tonsils and variously called chancriform angina, diphtheroid angina, ulcero-membranous angina, and sometimes ulcerous angina. This can be readily mistaken for some of the other forms of membranous formation of the tonsils and especially for diphtheria or syphilis, but it is characterized by the presence of a peculiar bacillus and spirillum in conjunction (Plate II,—4), which from studies made by various observers, are the specific organisms of this affection when both occur in symbiosis. That such is the case, is shown by the presence of these organisms in predominating amounts, or practically pure culture in the membrane; by their gradual disappearance during the time that ulceration is undergoing resolution, and their rapid total disappearance when the ulcero-membranous changes have disappeared; by the absence, or comparatively small number of other and more common organisms; and also by the fact that a number of cases have been reported in which the affection has been transmitted from one individual to another and the same organisms found in both. The condition is closely related to ulcero-membranous stomatitis, or is identical with it, and it also seems to bear an intimate relationship to some of the purulent affections of the alveolar process.

Vincent has described two forms of this affection, the first being rare and characterized by a croupous exudate on the tonsil,

without much loss of tissue and containing only the fusiform bacillus; it runs a mild course and as soon as the membrane separates, a superficial ulcer is formed which is then covered by a second membrane, permanently disappearing in a few days. It is not necessary to consider this form here, but the second variety which differs only in degree, presents both the fusiform bacillus and the spirillum; is more chronic in its course and destructive to the tonsillar tissues. Examination shows the membrane confined to one tonsil, more rarely both, but it may involve the uvula, soft palate, gums, mucous surfaces of the cheeks, or even the lips. At the onset, the membrane is circumscribed, it may vary in color, as grayish, yellowish, or brownish, and during the first and second day it is easily detached. Following this, the tonsil becomes more inflamed, the membrane invades the deeper cells, and ulceration develops with localized destruction of tissue. The membrane then becomes elevated above the surface, is thicker and softer, more or less adherent, although occasionally it may become detached at the edges and even be coughed out, while a day or two later it may be readily removed, or a probe will penetrate it and disclose an ulcerating cavity beneath; a new membrane reforming as soon as the former has been removed. When the membrane disappears during treatment, the remaining ulcer has a rough, worm-eaten floor, presents a punched out appearance and is on a level with, or slightly elevated above the surface.

Both the local and the general symptoms are of little moment, and under proper treatment the disorder runs a benign course of two or three weeks; but in exceptional cases the duration may be greatly prolonged and it may be several months before the ulcer has completely disappeared. This torpid character is of considerable importance in the diagnosis of the affection. There may be slight rise of temperature, but this is often absent, the onset being insidious with some pain on swallowing, but the general health is unaffected. The marked feature of the affection and that which it is essential to recognize, is the combination of the two organisms, the fusiform bacillus and the spirillum. The former is thin and needle like, pointed at both ends and swollen in the middle; it is motile and is found to the exclusion of other germs during the first and second days of the disease. It is present in large numbers

and is often arranged in bundles, or forms acute angles, while the majority are irregularly scattered over the field. The associated spirilla are thin, long, and motile, and are found more abundantly on the surface of the pseudo-membrane than in the deeper parts. It is necessary to make a smear from the membrane or ulcer, to interpret the nature of the condition, since a culture is of no value; should the organisms not be found in this manner, direct examination of a piece of membrane will clear up the diagnosis.

It is important in this connection to note briefly that recently Wright and Mackie have suggested that possibly these organisms are but a stage in the life history of the trypanosome; the former states that the fusiform bacillus is not a bacillus, its length, vacuolation, staining properties, and undulatory movements being suggestive of protozoic origin, and the plaques in Vincent's angina are like those in dourine, a form of trypanosomic invasion in horses. The obverse of this is shown by Mackie who states that under certain cultural conditions, the trypanosome loses many of its features and becomes similar to the organisms here described.

The combination of this form of tonsillitis with other diseases may also occur, and then the diagnosis becomes extremely difficult, or for a time impossible. It may be engrafted on syphilis, may be associated with stomatitis and especially that due to mercury, or may be found in conjunction with diphtheria.

Acute ulcerative tonsillitis of Moure, formerly considered as a subvariety of lacunar tonsillitis, is closely allied to, or identical with, Vincent's angina, as it resembles the latter in many respects. It is inaugurated as a mild inflammation of the crypts, and when the membrane is formed, it presents the appearance of a cauterized tonsil from which the slough is about to separate. There may be one, or more ulcerated areas on the mesial aspect of the tonsil, covered with a grayish pseudo-membrane which is thick and readily removable. The ulcer presents clean cut borders with a mamillated floor, is round or oval in shape, and may be multiple; but it never coalesces and the tonsillar tissue is but slightly inflamed. The entire tonsil may be involved by a large ulcer covered with membrane, but it never extends beyond these limits. Slight discomfort may be complained of, the adjacent glands are not enlarged, and the temperature is only occasionally above normal, so that

constitutional symptoms are absent. Inasmuch as no definite organisms have been found associated with this condition, bacterial examination is only valuable in a negative aspect; but as it may resemble syphilitic infection of the tonsil, one must be guided by the course of the disease, by the history and presence of other symptoms in syphilis, and by the characteristic feature that the ulcero-membranous process is always located near the center of the mesial aspect of the tonsil and never extends beyond its borders, while in syphilis, the reverse is the case.

PNEUMOCOCCIC TONSILLITIS.—Pneumococcic tonsillitis (Plate I,—4) is mostly confused with that due to the streptococcus; it presents few clinical points for differentiation, and the general symptomatology is similar. The membrane is apt to be firmer in texture and more adherent than in the streptococcic form and it may be exceedingly thick, presenting almost a cartilaginous appearance. While commencing on the tonsil, it is apt to invade the entire pharynx and soft palate and can be removed without leaving an ulcerated surface; but it reappears within a short time. The development of the membrane is accompanied with abrupt symptoms; sudden rigor or chill, rapid rise in temperature to 103° F. or more, and considerable prostration, in the majority of cases bearing a striking resemblance to pneumonia. The tonsil is inflamed as is the adjacent mucosa, there is pain and a sense of constriction in the pharynx, and occasionally a dermal erythema may suggest scarlet fever. As the membrane may be removed in long strips, it will show on examination, a pure, or almost pure, culture of the pneumococcus (Plate II—1), which will clear up the nature of the affection at once, or when this still remains doubtful, culture will demonstrate the organism present.

MICROCOCCUS TETRAGENUS TONSILLITIS.—Equally infrequent is the membrane produced by *Micrococcus tetragenus*, which is ordinarily a saprophyte in the buccal cavity. The tetragenic involvement of the tonsils is usually associated with the streptococcus and staphylococcus, but the former predominates and may produce small, lenticular, white patches, or a diffuse, grayish membrane covering the greater portion of one or both tonsils, or spreading over the pillars, uvula, and pharyngeal wall. The objective throat symptoms present a variable aspect, as they may resemble

diphtheria when both tonsils and adjacent mucous membrane are covered with the membrane, which is easily detachable, but leaves a bleeding surface again becoming covered with the exudate, until it finally disappears in five or six days. Nothing of diagnostic value can be gained from the symptoms, as they differ in no way from other forms of angina; the onset being acute, accompanied by high temperature, sore throat and headache, while the tonsils are enlarged, the mucosa injected, but the adjacent glands are not swollen. Microscopic examination will reveal the characteristic micro-organism (Plate II,—3).

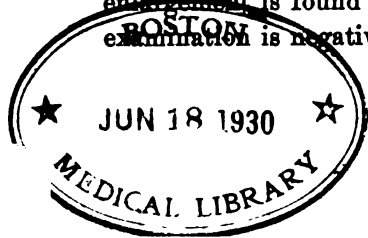
BACILLUS COLI TONSILLITIS.—A growth on the tonsils of *Bacillus coli communis* presents more or less characteristic symptoms. It is accompanied with digestive disturbances of greater severity than the local condition would seem to warrant; there is slight dysphagia, absence of glandular enlargement, and the development of a membrane, dull white in color and usually confined to a few of the crypts, but later it may spread and form a large pultaceous patch, slightly adherent, but not producing bleeding when removed. As it begins in isolated areas it may be mistaken for mycosis, but differentiation should not be difficult, as the two conditions differ in every respect.

THRUSH.—The thrush organisms and especially *Oidium albicans*, while as a rule forming isolated patches on the tonsils and adjacent mucous membrane, may at times form a definite exudate closely resembling diphtheria. In adults, the symptoms assume a semi-acute or chronic form and may last for months, while in children the disease in an acute form produces the general symptoms found in streptococcic angina, accompanied with congestion of the oropharyngeal mucous membrane. The tonsils become inflamed, the adjacent lymph glands enlarged and painful, and a thin gray or white membrane forms, in no way clinically different from that produced by the staphylococcus. In severe cases, a similar and thicker pseudo-membrane is apt to form on the pharyngeal walls and coalesce with that on the tonsils, forming an elevated mass interfering with deglutition. Should the patient be seen at this stage, a diagnosis will be impossible except with the microscope which will show the spores and mycelial threads of *Oidium albicans*, but later, firm, isolated, grayish white patches appear on the tongue

and materially increase in size. After an indefinite period, the membrane disappears completely and the acute symptoms subside, or ulcerated areas may remain. While occasionally, the clinical symptoms will be such that the affection may be readily recognized, yet, as a rule, dependence must be had upon the finding of the particular organisms, and this may be confirmed by the reproduction of the affection in laboratory animals.

MYCOSIS OF THE TONSILS.—Formerly, mycosis of the tonsils was supposed to result from implantation of *Leptothrix buccalis*, an otherwise harmless oropharyngeal saprophyte, but recent researches have shown that although this fungus is present in such cases, it bears no etiologic relation to the isolated tufts, or patches of pseudo-membrane, which are now known to be the result of a keratosis of the epithelium and especially that of the crypts. It may be limited to the tonsil as a large white, or whitish-yellow patch and examination will show that it projects above the surface, is exceedingly hard, firmly attached and when forcibly removed leaves a bleeding surface. The condition is noninflammatory and chronic. General symptoms are entirely absent. Usually there are no subjective local symptoms, except some occasional stiffness of the throat, and if the changes be extensive, more or less irritation.

HERPETIC TONSILLITIS.—Following the development of herpetic vesicles on the tonsil, an ulcerated surface may remain covered with false membrane for three or four days and then disappear, leaving no trace of its existence. Preceding the membrane, the delicate vesicles are rarely observed, as they last but a short time, rapidly rupture and the resulting ulcer that is formed, resembles a tonsillar chancre. At first it presents the symptoms of acute tonsillitis and is associated with the peculiar pain accompanying herpetic eruptions elsewhere. The membrane is usually limited to one tonsil, although adjacent tissues are inflamed; it is dirty white in color and is the result of necrosis of the epithelial cells associated with a fibrinous exudate. The resultant ulcer is circular in shape and more or less punched out, and there is absence of glandular enlargement. The onset is quite characteristic and readily differentiates this condition from chancre, but in addition, glandular enlargement is found in the latter, and in both instances, bacterial examination is negative.



In all cases in which a pseudo-membrane is found on the tonsil, it is essential that syphilis or diphtheria be eliminated, and while it is not desired to describe these affections, it is necessary to consider them to some extent, in relation to the conditions previously mentioned.

SYPHILIS may simulate any of the affections here described, either as the chancre, the secondary lesions, or the destructive tertiary changes. Chancre of the tonsil, while the rarest of syphilitic manifestations here, may develop with constitutional symptoms, sudden onset, differing in no respects from acute tonsillitis and accompanied with physical depression and severe local symptoms. On the other hand, general symptoms may be absent, with little local signs except a membrane confined to one tonsil, but in all cases, the adjacent lymphatic glands are enlarged and indurated and treatment produces little change in its appearance.

In both secondary and tertiary syphilis, acute febrile symptoms may be present for a time, and the mucous patch, or breaking-down gumma, may simulate other conditions, as the tonsils are inflamed; there may be dysphagia, and the lesions may be bilateral especially in the secondary stage, when the pseudo-membrane may involve the pharyngeal walls and soft palate (Plate I,—3). The lesions are usually symmetrical, a peculiar red hue of the mucosa is present, there is glandular enlargement, and the membrane may or may not leave a bleeding surface on removal. In some cases the differential diagnosis from diphtheria is not possible from the clinical picture alone and cultures will have to be made to interpret the findings. When general symptoms are absent, the mucous patch, or ulcer, is generally unilateral, yellowish, brownish, or white in color and may cover not only the entire tonsil, but also the adjacent pillars. The local symptoms as a rule are trifling, occasional slight soreness being complained of, but other symptoms of the syphilitic dyscrasia will permit an early diagnosis.

DIPHTHERIA in contrast with the other affections mentioned, is an asthenic disease, the temperature is usually not high, and the exudate rapidly tends to spread and invade areas that other forms of membranous tonsillitis do not involve. At first the membrane is yellowish, grayish, and ragged, varying in thickness; while later it becomes grayish-black and has a peculiar odor (Plate I,—6). It

should be remembered, however, that in exceptional instances, it may be confined to the tonsillar crypts during its entire course and present little local or constitutional symptoms, the croupous exudate being limited to the walls of the crypts, so that the diagnosis could only be made by finding the Klebs-Löffler bacillus (Plate II,—2). As has been shown, a bleeding surface remaining after the removal of a tonsillar membrane, is not characteristic of this disease, since it may occur in other infections whenever a croupous exudate is formed with degeneration of the superficial layers of the mucosa. The same may also be said of albuminuria, as this bears a direct relation to the height of the temperature; but while it is more frequent in diphtheria it is not uncommon in other varieties of tonsillitis, especially when the temperature remains high for several days.

TREATMENT

The treatment of membranous tonsillitis, with the exception of diphtheria and syphilis, which it is not desired to consider here, is both local and general; the former is indicated in all cases, while the latter is suggested only in such cases that present constitutional symptoms. As the tonsils form a part of the alimentary canal and some derangement takes place when the general symptoms are marked, it is desirable to open the bowels as soon as the patient is seen. For this purpose nothing is as efficient as small, frequently repeated doses of calomel, followed by a saline. In the adult, tincture of aconite (U. S. P.) is valuable to reduce temperature and lessen the pharyngeal discomfort; it should be given in five-minim (0.30 c.c.) doses every hour until the physiologic action is obtained, and then the same amount should be given at longer intervals, depending upon the temperature and condition of the patient. In the less robust, tincture of belladonna is of value, in 2 to 4 minim (0.12 to 0.25 c.c.) doses every two or three hours, until the throat becomes dry, when the symptoms will become alleviated and oft-times the condition may be aborted if seen early. Salol is efficient if given in five-grain (0.30 gram) doses every three hours, or even larger amounts when the symptoms are exaggerated and headache, muscular pain, etc., are complained of. Probably this or other form of the salicylates, is the most efficient single remedy we possess in the treatment of these forms of tonsillitis, but in order to obtain

prompt results, it is necessary to give large doses at frequent intervals, often as much as five grains every hour for several hours being necessary before the general symptoms subside. Phenacetin, antipyrin, etc., should not be employed either in the streptococcic or staphylococcic anginas, on account of their depressing effect on the heart and the tendency in these forms of tonsillitis to the development of grave complications of serous membranes, especially of the heart, even in apparently slight cases. On account, therefore, of these sequels and the prostration that is apt to develop in some cases at a later stage, it is well to keep the patient in bed until the temperature is normal, or other symptoms indicative of toxin poisoning have disappeared.

In the robust adult, $\frac{1}{12}$ grain (0.005 gram) of pilocarpin, to produce sweating, is often efficient at the onset when the membrane is forming; if this be followed by salol, or sodium benzoate, the course of the affection may often be materially shortened, but it is necessary to employ this procedure in the sthenic case and under no circumstances is it applicable in the weak or debilitated. As some acute cases of tonsillitis are clinically indistinguishable from diphtheria, I believe it good practice not to lose valuable time waiting for the results of a culture to determine the nature of the affection, but to consider the disease as diphtheria until disproved and at once administer a curative dose of antitoxin, if the least doubt exists. Along these same lines, it is advisable especially in children, to isolate such cases until diphtheria has been eliminated and even when the staphylococcus, streptococcus, or the organisms of Vincent's angina are the cause, it is best if such be possible, to obtain partial isolation. While there is no definite proof that these affections are always infectious, yet the transmission from one to another, especially in the same family, is frequently seen, and in the first two varieties it is undoubtedly endemic at times, while the clinical features would seem to indicate some form of isolation as an essential part of the treatment, or at least having the patient avoid others whose tonsils are abnormal in any way. In Vincent's angina, especially when acute, a number of instances have been recorded in which the infection was transmitted to another individual, and while the contagion is undoubtedly limited, it is most marked in the early stages but may occur at any time. Should

streptococci predominate, with grave constitutional and local symptoms, it is always well to try anti-streptococcic serum in conjunction with other measures.

When the tonsillitis runs a more or less chronic course, the treatment is essentially tonic—to build up the general health, diminish anemia which is usually present, and to remove local and general causes, which may play some part in the throat disorder. Often some gastro-intestinal disorder is present, and this must be corrected before successful results can be obtained; or it may be essential to change the hygiene of the individual, or direct him to such forms of living as will best conserve his general health. Each case presents its own problem from this aspect and to obtain the best results, it is necessary to study the individual and apply such measures that seem suited to the case.

Local measures are a necessary part of the treatment in every instance of membranous tonsillitis irrespective of its cause. When the disease is the result of the staphylococcus, streptococcus, pneumococcus, micrococcus tetragenus, or the bacillus coli communis, the treatment is similar, so that these may be considered together from this aspect. To keep the mouth and pharynx clean and reduce to a minimum the secretion a gargle is necessary; for this purpose nothing is as valuable as diluted hydrogen peroxide, equal parts with sterile water, or lime water may be used as the diluent, the proportions being varied as desired. It should be employed every hour when there is much membrane, while in mild cases, two, or three times a day, will be sufficient. In adults, salol in 5 per cent. alcoholic solution, one dram to a glass of water, has given me good results as a gargle, every one to three hours; it is not always satisfactory in children and hydrogen peroxide is the best for this purpose.

If the membrane is limited in extent, it will be well to remove it without resorting to forcible measures, by a cotton tipped probe and that portion which is lacunar in origin, should be removed with a small, dull curet, by insinuating the instrument into the lacuna and lifting out the mass. As far as possible, the membrane should be removed and all parts of the tonsil, or adjacent tissues covered with the membrane should be mopped with hydrogen peroxide and followed by the application of a 10 to 20 per cent. solution of any

of the organic silver salts. This should be done at least once daily by the physician and in severe cases twice a day, as it will cause more rapid disappearance of the membrane and lessening of both local and general symptoms. Nitrate of silver has been used for the same purpose, but it has many disadvantages, as it produces an albuminoid coagulation which resembles false membrane, is irritating, and is not as efficient as a bactericide.

The application of pure guaiacol to the tonsils in the early stages, is efficient in cutting short membrane formation in some cases, or the exudate may be removed and the following applied to the crypts once daily, for two or three applications:

Menthol crystals,	20 grains	18
Guaiacol,	2 drams	80
Glycerin,	2 drams	80
Alcohol,	5 drams	200

A 50 per cent. solution of guaiacol in oil of almonds may be successful in many instances. When there is much inflammation of the tonsils and adjacent mucosa, a tablet of orthoform dissolved in the mouth every few hours as required, is of value in relieving the distress. When irritation of the throat is absent, the membrane thick and adherent, and the tendency is toward a semi-acute course, the application of formalin every one or two days, is very efficient. It should be applied only to the areas involved in the membrane formation and should be used in strength not exceeding 1 per cent. in glycerin; some pain may be complained of for a short time after the application, but is usually transient.

Irrespective of whatever local treatment is used in Vincent's angina, a successful result is usually not obtained during the period of membrane formation, but follows the development of the resultant ulcer; and not infrequently the course seems to assume a chronic phase irrespective of treatment. Hydrogen peroxide may be used as a mouth wash, but a dilute solution of potassium permanganate has seemed to be of more service, while occasionally a solution of potassium chlorate may be useful. For local application, tincture of iodine, or Lugol's solution, is most successful, the applications being repeated daily, or less frequently as indicated by the results obtained. Should these not be efficient, dry methylene blue may be applied in the same manner, or the parts may be

painted with a saturated solution of the methylene blue, the mouth being washed with water immediately after the application, to remove the disagreeable taste. While in some cases, better results may be obtained with local applications of balsam of Peru, the silver compounds previously mentioned, or in obstinate cases, parenchymatous injections of a two-per-cent. phenic acid solution may be made.

In the tonsillitis described by Moure, the best results have been obtained by gargling with a mild bromide solution and painting the affected area with a zinc chloride solution (1 to 30), to which a small amount of cocain may be added if it causes pain. When the tonsillitis is the result of *Oidium albicans*, potassium chlorate makes an efficient gargle, and the membranous areas should be rubbed with diluted tincture of iodine. In herpetic tonsillitis, most relief may be obtained by painting the tonsil with equal parts of boroglycerin and compound tincture of benzoin.

Finally, for the so-called mycosis of the tonsils, various remedies are used with more or less success, such as tincture of iodine, silver nitrate in strong solution, hydrogen peroxide, and chromic acid. While these remedies are sometimes effective in mild cases, they are of no value in the severe type, and the best methods are to remove the membrane by the curet, or still preferably, the galvanocautery; the x-rays may be employed, as Hurd reports a case cured in this manner.

THE POSITION AND SIZE OF THE HEART IN ADVANCED MITRAL STENOSIS

BY M. HOWARD FUSSELL, M.D.

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IN 1903 I performed an autopsy on a subject dead of mitral stenosis who had been under observation for about four years and in whom death had resulted from loss of cardiac compensation. At the section, on removing the sternum and cartilages, the heart was observed to lie transversely in the thorax; the right border was formed by the right auricle; and the apex of the heart was formed by the right ventricle. In other words, the entire anterior surface of the heart was formed by the right cavities, and the left side of the heart was entirely posterior—due to the great dilatation and hypertrophy of the right side. This is well shown by Figs. 1 and 2, taken before the heart was opened. The history of the case is as follows: John L., a boy 13 years old, was brought to my office October 3, 1899, with the following history: His parents are living. He is the only child, one brother and one sister having been born prematurely and died. The patient had scarlet fever three or four years ago. He never had rheumatic fever. When a very young child he was occasionally seized with attacks of unconsciousness, accompanied with cyanosis. These attacks have disappeared for the past several years. Two years ago he had an attack of fever which lasted four weeks, and he has never been well since. He has had dyspnea, slight cough, palpitation of the heart, and headache. On examination the following notes were made: He is of exceedingly short stature, about 4 feet in height; his fingers are clubbed; he has an asymmetrical chest, the cardiac region being extremely prominent. The apex beat of the heart is in the sixth interspace, one inch outside the nipple line. The right border of the deep heart dulness is midway between the right nipple and the right edge of the sternum, the left

border is one inch outside the nipple, and the upper line is at the second rib (Fig. 3). The radial pulse is extremely small and weak. At the base of the heart both sounds are clear; the pulmonary second sound is accentuated. As the apex is approached a musical systolic murmur is heard; there is marked accentuation of the first sound, and a rough presystolic murmur.

On November 17, 1899, I was called at midnight, and found the lad suffering with urgent dyspnea, a severe cough and cyanosis. His temperature was 100° F. There was much expectoration of bloody frothy mucus. On examination there were râles over both lungs and a consolidation of the right base. The lad was extremely ill during the entire month, but finally recovered.

On December 20, 1899, the heart dulness was about the same as at the first visit, and the presystolic thrill was noticed in the region of the apex. The liver reached 2 inches below the margin of the ribs and pulsated distinctly. The spleen could not be felt.

On January 12, 1901, the patient's abdomen was much distended with liquid, both legs were markedly edematous, and a loud systolic murmur was heard over the chest. The first sound was accentuated; no presystolic murmur was heard. The systolic murmur was of the same character as the one heard at the first visit, and was interpreted as the murmur of mitral regurgitation.

On December 28, 1902, the patient was seized with rather severe hemoptysis, the bases of both lungs were full of bubbling râles, but there was no fever and no consolidation of the lung. The systolic murmur was the only one heard.

On January 19, 1903, the patient died, having suffered much with dyspnea since the last note.

Between the date of the first visit and his death, the child had many attacks characterized by dyspnea, palpitation, extreme ascites, and edema of the lower extremities. The edema was always relieved promptly by the administration of $7\frac{1}{2}$ grains (0.5 gram) of theobromin four times daily. His dyspnea was usually relieved by nitroglycerin. He was often confined to bed for two or three weeks at a time. He would then recover sufficiently to be up and out of doors, though he was never able to walk with comfort more than two or three squares. •

At the necropsy, on opening the chest, almost the entire



FIG. 1.—Anterior surface of the heart, showing the auriculo-ventricular depression, and to the left the right auricle, and to the right the right ventricle.



FIG. 2.—Posterior surface of the heart, showing the auriculo-ventricular depression, and to the left the left auricle, and to the right the left ventricle.

mediastinum was occupied by a greatly distended heart. The left border of the heart was exactly in the mid-clavicular line. There was no unusual amount of fluid in the pericardium. The heart lay transversely, the right border being formed by the right auricle and the left border by the right ventricle. The entire anterior portion of the heart (Figs. 1 and 2) was composed of the right side of the heart, about three-quarters of the surface was composed of the right ventricle, and the other fourth of the right auricle. The apex of the heart was made up entirely of the right ventricle. There was a distinct sulcus between the ventricle and the auricle. The right auricle was filled with currant-jelly clot.

There were extensive adhesions between the pericardium and the right lung. The right auricular walls were extremely thin, in some places almost like paper. The cavity was about the size of a man's closed fist. The right auriculo-ventricle orifice admitted four fingers and the thumb. The right ventricle contained chicken-fat clots which averaged about three-sixteenths of an inch in diameter. The pulmonary artery was extremely small compared with the cavity from which it arose. The left auricle was greatly enlarged, but was hidden back of the huge right heart. The left auriculo-ventricular orifice was almost entirely closed, being a mere slit through which it was impossible to pass even the tip of the little finger, and being fully occupied by a knife-blade passed through it. The left auricle was filled with chicken-fat clots. The liver and the kidneys were not examined, on account of the objection of the family to opening the abdominal cavity.

The physical signs are explained to a great extent by the results of the post-mortem examination. During life it was supposed that the loud systolic murmur was due probably to mitral regurgitation. As a matter of fact, it is seen by the specimen that practically no blood could have regurgitated through the mitral orifice. The murmur must certainly have been due to regurgitation through the tricuspid orifice. During life the presystolic stenotic murmur frequently entirely disappeared, but the sharp, "snappy" first sound, so characteristic of mitral stenosis, was always present.

In searching through the literature of mitral stenosis, I find a curious lack of accurate description of the remarkable condition

of the heart which must frequently occur, and which, of course, has been previously observed. About the only account that accurately describes the condition was given in 1857, by Bamberger,¹ who says: "The position of the heart is horizontal. The anterior surface is made up almost entirely of the dilated right side of the heart, while the left is pushed to the back, so that on viewing the anterior surface none or only a narrow strip of this side can be seen."

Babcock² says: "Percussion shows a similar change in absolute and relative cardiac dulness as described in the article on mitral regurgitation . . . viz., an increase of cardiac dulness toward the right side and downward. This increase bears a direct relation to the degree of stenosis. According to Leube, percussion shows a more pronounced enlargement of the right heart in this form of mitral disease than in insufficiency, a point he regards as of importance in the differential diagnosis between these two affections. Another difference lies in the fact that, owing to atrophy instead of hypertrophy of the left ventricle, dulness is not likely to be much, if at all, increased to the left." This description lacks the directness made by Bamberger which I have attempted to give, but the cut (Fig. 4) in the volume is suggestive of the conditions I have described.

Sahli³ says a dilatation of the right ventricle is as frequent in mitral stenosis as in mitral insufficiency. In late stages mitral stenosis is accompanied by increase of the heart dulness to the right and also to the left. The increase of dulness toward the left may be due to actual increase in size of the left ventricle, but usually it is due to the increase in size of the right ventricle, the dulness thereby being increased toward the left. The cut (Fig. 5) which accompanies this description does not show whether the right or left side of the heart is anterior.

Musser⁴ states: The area of cardiac dulness is increased upward and to the right and left of the margin of the sternum. Sometimes it extends upward as high as the second rib; this in-

¹ Lehrbuch der Krankheiten des Herzens.

² Diseases of the Heart and Arterial System.

³ Klinische Untersuchungs-Methoden.

⁴ Medical Diagnosis.

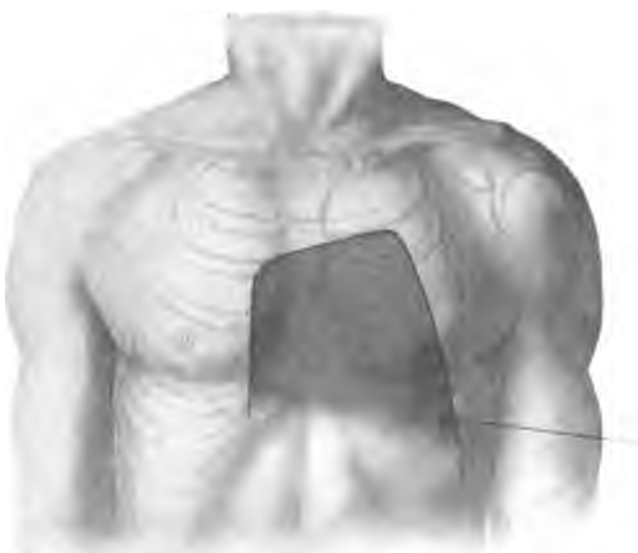


FIG. 3.—The deep cardiac dullness in the case herewith reported.



FIG. 4.--The cardiac dulness in mitral stenosis, according to Babcock.

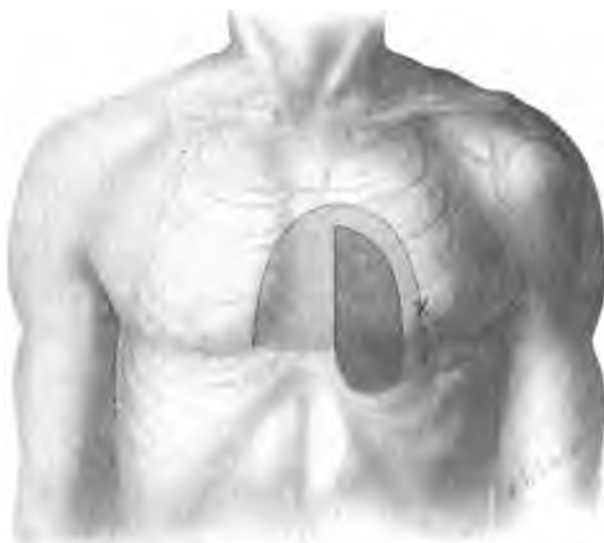


FIG. 5.—The superficial and the deep cardiac dullness in mitral stenosis, according to Sahli.



FIG. 6.—The size of the heart and the superficial and deep cardiac dulness in mitral stenosis, according to Musser. *a*, left side of the heart; *b*, right side of the heart.

crease is quite characteristic. Fig. 6 which accompanies this text is meant to show that the apex beat of the heart in this condition is made by the right ventricle, and it shows, as in the case here reported, that the anterior surface of the heart is made up exclusively of the right side of the heart.

In looking over the reports of the Pathological Society one is struck by the very few cases of mitral stenosis reported. One made by F. P. Henry is typical of the condition I have described, although he fails to lay the stress on the whole right side of the heart being anterior. Dr. Henry⁵ states: The autopsy at which this typical specimen was obtained was made on July 1, 1899. On opening the thorax an immense pyriform tumor came in view. The lungs were crowded on either side so as not to be visible, and were adherent to the so-called tumor by their anterior edges. It was evident that the mass was largely made up of fluid, and my first impression was that it was the pericardium distended with blood or hemorrhagic effusion. An incision showed this to be a mistake, the pericardial sac containing not more than two ounces of serous fluid. On separating the layers of the pericardium, which were united by soft, recent, pasty adhesions, the enormous heart came in view. The right auricle, which was greatly dilated and quite as large as a normal heart, was filled with dark clot, which being carefully removed was found to weigh seventeen ounces. The right ventricle was also greatly dilated, but contained much less clot; the coagula were also intimately adherent to the columnæ carneæ, and therefore removed with some difficulty. The right auriculo-ventricular orifice was, of course, widely dilated, but the tricuspid valves seemed competent, in spite of some thickening and atheroma on their free borders. The left was greatly enlarged, though smaller than the right, and its walls hypertrophied. The mitral orifice was converted into a mere slit, while the edges could be made to come into perfect apposition, and this apparent competency of the valve can still be plainly demonstrated. The normal mitral valve has been replaced by thick, tendinous diaphragm perforated by a button-hole orifice too small to admit the tip of a forefinger. The left ventricle is comparatively diminutive, though

⁵ Transactions of the Pathological Society.

much more capacious than a normal ventricle. The walls of both ventricles were abnormally thin.

The descriptions by the following authors leaves much to be desired rather from incompleteness than from inaccuracy in explaining the broad round heart of mitral stenosis:

Edmund H. Colbeck ⁶ states that the hypertrophy of the right ventricle in mitral stenosis is greater than in any other form of valvular disease of the left side of the heart.

Thomas L. Stedman,⁷ speaking of the late stages of mitral stenosis, says the presystolic murmur becomes fainter and disappears, while a loud systolic murmur shows itself in the neighborhood of the ensiform cartilage, most distinctly at the fifth intercostal space to the right of the sternum. This murmur depends upon incompetence of the tricuspid valves.

Tyson ⁸ says: Percussion recognizes cardiac enlargement in the direction of the left auricle and not of the left ventricle.

Anders ⁹ states that percussion shows an extension of heart-dulness of the right, frequently 5 cm. (2 inches) beyond the sternal margin, as a result of hypertrophy of the right ventricle, and upward as high as the second rib on either side of the sternum. Increase in the cardiac dulness to the left also occurs not infrequently, and is attributable to excessive enlargement of the right ventricle, though more often of the left ventricle in consequence of associated insufficiency.

Osler ¹⁰ states that percussion gives an increase in the cardiac dulness to the right of the sternum and along the left margin; not usually a great increase beyond the nipple line, except in extreme cases, when the transverse dulness may reach from 5 cm. beyond the right margin of the sternum to 10 cm. beyond the nipple line.

The points I wish to emphasize are—not only that great hypertrophy and later massive dilatation of the right side of the heart occur in advanced mitral stenosis (a fact spoken of by all authors), but that the right heart is so massive that it completely overshadows the left heart, that the apex beat is formed by the

⁶ Diseases of the Heart.

⁷ Twentieth Century Practice of Medicine.

⁸ Practice of Medicine.

⁹ Practice of Medicine.

¹⁰ Practice of Medicine.

right ventricle, that the right border of the heart is formed by the right auricle and the left border by the right ventricle.

Recognizing this, one can easily comprehend why treatment, especially by drugs, is so unsatisfactory in mitral stenosis. The lungs are full of blood, from the left auricle, and later from the right auricle and ventricle, the left auricle is thin and weak. The wonder is not that patients have much dyspnea, but that they are able to live. The evident lesson to be learned is that rest is the most essential factor in the treatment in order to give the laboring heart some relaxation.

THE ORIGIN AND PREVENTIVE TREATMENT OF OXALIC ACID DEPOSITS IN THE URINE *

A CLINICAL LECTURE DELIVERED AT THE BERLIN INSTITUTE FOR MEDICAL DIAGNOSIS

BY G. KLEMPERER, M.D.

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GENTLEMEN: Renal calculi containing oxalic acid as a chief constituent are much more common than is generally believed. Since, according to recent investigations, from 30 to 50 per cent. of renal calculi are made up chiefly of oxalic acid, the question of how to prevent the precipitation of oxalic acid and the formation of calculi deserves our full attention. Heretofore, it has been taught that considerable importance attaches to prohibiting certain vegetables, especially spinach; but it is well known that in spite of prohibitory rules, relapses of oxalic acid deposits and of calculi formation, the persistence of the oxaluric state, are frequently encountered. I have thought it wise, therefore, to communicate to you the practical results of a series of investigations of the subject that I have carried out in this Institute in association with Dr. Tritschler.

If a person takes a medium-sized portion of spinach, as it is usually prepared, he takes with it about 100 milligrams of oxalic acid—which is soluble in the gastric juice. Of these 100 milligrams, about 15 milligrams appear in the urine. Since not more than 10 milligrams are discharged with the feces, it becomes interesting to inquire the fate of the remainder. I believe that I am warranted in saying with certainty that the remainder becomes destroyed by the intestinal ferments and bacteria. If 100 milligrams of calcium oxalate is admixed with putrefactive bacteria or with human feces and placed in the incubating oven for some time, it will be observed that from 80 to 90 per cent. of the calcium oxalate disappears. Whether oxalic acid injected by the human subject is broken up by the intestinal bacteria or whether, as has been suggested, certain metabolic processes destroy it after absorp-

* Reported and translated by Leon Lebovici, M.D. (Vienna), Carlsbad, Bohemia.

tion, is open to question. We know that human blood is able to break up sodium oxalate when the two are brought together experimentally, although this does not mean that the same reaction must occur when the blood is circulating in the body. The blood from gouty subjects is capable of destroying uric acid, although uric acid may be found in the circulating blood. We have tried, therefore, by experiments on the dog and human subjects to determine the effect of the subcutaneous injection of oxalic acid salts.

A robust, healthy medical student, 23 years old, voluntarily consented to the injection of 10 milligrams each of sodium oxalate and calcium oxalate beneath his skin. During the period of experimentation he was living on a mixed diet, consisting daily of meat, bread, butter, pastry, broth, coffee, and two glasses of beer. Tea, fruit, and vegetables were excluded. The injection of the sodium oxalate, 1 c.c. of a 1 per cent. solution (0.010 gram) gave rise to reddening and swelling of the forearm at the site of injection, but this shortly disappeared. Calcium oxalate in the same amount gave no local reaction. Both salts were recovered from the urine without loss, the oxalates evidently passing unchanged from the blood through the kidneys into the urine.

If one considers the oxalic acid in the urine to be derived from oxalates absorbed by the gastro-intestinal tract, it would follow that in patients who have been fed with food free from oxalic acid—meat, fat, pastry—the urine should show no trace of oxalates. Such, however, is not the case, because as Lüthje has shown, a dog caused to fast for 12 days excretes 7 milligrams of oxalic acid in the urine during 24 hours. No adequate explanation of this occurrence has been given until the following investigation was carried through. Recently Lommel found that after feeding the human subject with gelatin there was an increase in the amount of oxalic acid excreted. As all oxaluria could be traced to an alimentary origin, we concluded that the difference in the effect of gelatin and of albumen was due to a difference in the final products formed by the absorption of these substances.

We then tested the effect of glycocoll (a gelatin sugar) and were able to establish the fact that subcutaneous injections of this substance into the healthy human subject is followed by an increase in the excretion of oxalic acid. Creatin was next tried; it represents a

substitute, methylglycocoll, and is normally present in muscle tissue (0.2 per cent.). This drug also increased the excretion of oxalic acid, a fact which had been recognized by Kühne 33 years ago. Finally, we found that glycocholic acid, a constituent of the bile, which may split into glycocoll and cholalic acid, also increases the amount of excreted oxalic acid. It is, therefore, evident that oxalic acid does not disappear from the urine even during starvation, the creatin of decomposing muscular tissue representing the source of its derivation. Hence the urine can only be rendered free of oxalic acid by withdrawing the oxalates and creatin from the food, that is, vegetables and meat, and at the same time preserving the nutrition of the organism in order to prevent destruction of albuminous material.

In attempting to derive any therapeutic benefits from the recognition of these facts we must acknowledge that it is absolutely impossible to withdraw meat and vegetables from a person's diet for any length of time. Nor is it necessary to do so, because it is of no importance to render the urine entirely free from oxalic acid which may be excreted in amounts of 35 milligrams in 24 hours without precipitation.

The problem which we wished to solve was not the prevention of the formation of oxalic acid, but rather to find a method whereby the oxalates could be prevented from precipitating. It has been believed by physicians and chemists that the solution of the calcium oxalate was made possible by the presence of the double phosphate—acid phosphate, perphosphate, etc.—of sodium. This explanation was originally propounded by Maddermann many years ago and copied in all the text-books since; but while correct to some extent it does not entirely account for the process. In many acid urines, uric acid and calcium oxalate may be precipitated simultaneously, the former especially precipitating when a large amount of the double phosphate of sodium is present in the urine. Hence in addition to the acid sodium phosphate there must be another agent acting to keep the oxalates in solution, and this we have found to be magnesium. In testing the urine of many patients subjected to special nutritive conditions we found that calcium oxalate is soluble in direct proportion to the amount of magnesium present and that calcium oxide inhibited this solubility.

The most favorable condition of solubility was the presence of over 20 milligrams of magnesium and less than 20 milligrams of calcium to 100 c.c. of urine. The proportion of the two is best expressed by $\text{CaO} : \text{MgO} :: 1 : 0.8 \text{ to } 1.2$.

An example of the effect of a different proportion of these substances is seen after feeding the human subject with milk only. While the amount of excreted oxalic acid is reduced to a minimum, it is precipitated because of the excess of lime and small amount of magnesium found in milk.

Therefore, from these facts and experiments we can prevent the precipitation of oxalates by withholding such food as spinach, cocoa, and tea which markedly increase the amount of oxalic acid present and allow meat, broth, rice, peas, bread, pastry, potatoes, apples, coffee, and beer, which are rich in magnesium, but poor in lime.

Most vegetables, fruit, and meat have only slight effect upon the excretion of oxalic acid. Milk, eggs, cabbage and fresh vegetables should be forbidden, however, owing to the large amount of lime. Large amounts of water should be ordered and as far as the oxaluria is concerned, there is no objection to allowing alcoholic beverages or coffee.

The amount of magnesium in the urine may also be increased by prescribing 2 to 4 grams of the chloride or sulphate of magnesium during a day. Only a portion of this is absorbed, the increase in the excretion of magnesium by the urine amounting only to from 1 to 2 decigrams in 24 hours; but even this increase is quite sufficient to increase the solubility of the calcium oxalate, especially after several days' administration of the drug. We found the double salt of the borate and citrate of magnesium to be least easily absorbed. In one patient magnesium sulphate in 2 gram doses daily was administered for a period of 3 days, at the end of which time the increased magnesium output of the urine was sufficient to dissolve completely all the calcium oxalate which had been precipitating.

In conclusion, let us hope that these brief remarks will aid in the prevention and treatment of oxaluria, as well as prevent the formation of oxalic acid renal calculi.

DEATH AND BLINDNESS AS A RESULT OF POISONING BY METHYL, OR WOOD, ALCOHOL AND ITS VARIOUS PREPARATIONS

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ALTHOUGH the toxic effects of preparations of methyl, or wood, alcohol are vaguely referred to in the older works on toxicology, it is only quite recently that the medical profession has had an opportunity of studying the action of this poison. The United State Dispensatory informs us that methyl alcohol was discovered in 1812, and was subsequently examined by Liebig, Kane, and others. It was (and is now) obtained by the destructive distillation of wood that also yields a number of other products, including acetic acid and tar. About 1 per cent. of this distilled product consists of an inflammable, volatile liquid which, when separated and purified, constitutes what is known as pyroxylic spirit. It is from this spirit that methyl alcohol—also known as wood spirit, wood alcohol, and wood naphtha—is obtained. Purified methyl alcohol is a mobile, colorless liquid, possessing a hot pungent taste and a peculiar aromatic smell. It mixes in all proportions with water, grain alcohol, and ether, and burns exactly like ethyl alcohol although with a less luminous flame. It has many close affinities with grain alcohol, dissolving practically the same bodies that ethyl alcohol does.

The Dispensatory of 1889 states that methyl alcohol was used in a limited way as a therapeutic agent, but it makes no reference whatever to its poisonous properties. It asserts that any effect which it may have is probably due to the impurities and not to the methyl hydrate in the mixture.

Twenty years ago, as now, it was used in commerce by hatters and varnish-makers for dissolving resins and gums, as well as by chemists and others for burning in lamps as a substitute for ordinary alcohol. It was found to be more economical for the latter purpose than ethyl alcohol, giving out more heat for equal weights of the two liquids.

The older Dispensatory remarks that "in Great Britain grain alcohol is subjected to a heavy duty, which, until lately, prevented it from being used in many manufactures; because the products of its use can be more cheaply obtained from abroad. The British parliament, wishing to encourage the use of alcohol in the arts, but not as a beverage, passed an act in 1885, allowing it to be used duty-free, provided it be mixed with at least one-ninth of its bulk of pyroxylic spirits, which renders it unfit for drinking, but does not spoil it for use in the arts. This mixture is called 'methylated spirits,' and is now employed extensively in Great Britain by hatters, brass founders, and cabinet-makers for dissolving shell-lac and other resinous substances, and by manufacturing chemists for making ether, chloroform, and sweet spirit of nitre. From the purification of pyroxylic spirit already referred to, so as to deprive it of offensive taste, it has been supposed that the intended operation of the British revenue laws might be evaded; but, in opposition to this idea, it is asserted that the purifying process is too expensive, on a large scale, to render it available for the purpose. The use of this spirit, however purified, would be unjustifiable in medical preparations, unless officially recognized."

. At this early date it never occurred to anyone to drink wood naphtha because of its nauseous taste and vile odor. Indeed, not more than three cases of serious poisoning from methylated preparations had, until June, 1904, been known anywhere. One of these occurred in France during 1877, the other two in Germany in 1899.

In recent years, however, the wood alcohol of commerce has undergone a complete change of character. Since 1896 the vile smelling, greenish liquid known as methylated spirit has been converted, especially in the United States, into a much more attractive fluid. Deodorized and deprived of its disagreeable taste, it now appears on the market in new forms and highly recommended as

a substitute for grain alcohol. These more attractive varieties of "deodorized" wood spirit can with difficulty be distinguished from ethyl alcohol. It has the same vinous odor, agreeable, warm taste, and some of the intoxicating qualities of ordinary alcohol, for which it is now so often substituted. Not only is it highly recommended as a suitable alcohol for "bathing and sponging the sick, making liniments, rubbing for rheumatism," but we know from sad experience that it has been and is now used as a substitute for grain alcohol to adulterate whiskey, "high balls," "punch," "hot drops," "witch hazel," "bay rum," "Florida water," "Eau de cologne," "Jamaica ginger," "extract of lemon," essences of all sorts, not to mention various "liniments," patent medicines, proprietary and domestic remedies, etc. This poisonous agent appears in the market under many fanciful names. It is now employed both in this country and abroad in enormous quantities, not only for legitimate purposes, but as an adulterant of numerous mixtures supposed to be made of pure ethyl alcohol. In the same way, we find on sale in many American drug stores and other shops "deodorized" methyl alcohol sold as Colonial Spirits, Union Spirits, Eagle Spirits, *Lion d'Or*, Greenwood Spirits and Standard Wood Spirits. This is how a refinery of wood spirit in Boston describes the particular "deodorized" product of their factory: "*Lion d'Or* is a 98 per cent. pure methyl alcohol, the remaining 2 per cent. being water. It is a methyl alcohol of exceptional and remarkable purity, manufactured on a commercial scale as a substitute for the best quality grain alcohol, or cologne spirits, as used externally in the arts and manufactures. *Lion d'Or* is readily miscible in all proportions with water, chloroform, ether, glycerine, and, in fact, in this respect is identical in behavior with the best known varieties of alcohol. Unlike other alcohols, *Lion d'Or* undergoes no deteriorating change with time, but after standing for years, will invariably open as pure and sweet as when first made. *Lion d'Or* is clear and limpid, of purest water whiteness, and such odor as it may possess may be described as faintly spiritous; the sweet, sickening odor of the grain alcohol of commerce, and the empyreumatic and tar-like odors of wood alcohol are quite lacking. This almost total absence of odor constitutes, we may say, the most conclusive proof of the purity of our product. *Lion*

d'Or may be, and is being, used in the preparation of the finest perfumes, and the most delicate scents are brought out to an advantage hardly possible even with the use of the best French spirits."

In other words, with the exception of the claim that this form of methyl alcohol can be drunk with impunity, there is, in the opinion of the manufacturers, practically no purpose to which "*Lion d'Or*" can be put in which it is inferior to ordinary grain alcohol.

The communications of Buller and myself,¹ and of myself² alone, furnish a record of at least 314 serious examples of methyl alcohol intoxication. Of these, 158 were well authenticated examples of blindness, while in 156 instances death followed. The great majority of these were the result of drinking some form of methylated spirits, generally the ingestion of some mixture into which "deodorized" wood alcohol entered as an adulteration.

A second important source of poisoning was shown to be inhalation. That blindness may be produced by absorption of the fumes of methylated alcohol through the lungs or skin, or both, has been denied by some observers. They bring forward as evidence of their contention that wood alcohol is innocuous so far as the inhalation of its fumes is concerned, the fact that in hat and whip factories, where the workmen are exposed to the odors of columbian spirits and other wood alcohol preparations, and where the atmosphere is laden with the evaporated fluid, no cases of death or blindness occur. I have already referred to a communication from a physician residing in a factory town where methylated spirit is largely used. "It is well known," says he, "that in the filling rooms of our factories many of the men, especially green hands, are affected with giddiness and act and talk as if intoxicated after working in these rooms. This intoxication, however, they attribute to the fumes of turpentine, benzine, and allied liquids that are largely used along with the wood alcohol. I believe the

¹ "Cases of Death and Blindness from Columbian Spirits and other Methylated Preparations." *Journal of American Medical Association*, October 1-29, 1904.

² "Poisoning by Wood or Methyl Alcohol and its Preparations as a Cause of Death and Blindness; a Supplementary Report." *New York Medical Journal*, January 7, 1905.

symptoms to be due to the fumes of wood alcohol and mean to investigate the subject a bit. I have just called up on the telephone the superintendent of one of our largest factories, who states that the poisonous character of wood alcohol is well known among the employes, and they had a very practical demonstration of it some years ago in the death of several men who drank it."

The truth is that when the fumes of wood alcohol are diluted with a sufficient quantity of pure air—conditions found in any properly ventilated factory—the inhalation is not dangerous to life or to the eyesight. Still I much doubt whether work in any wood alcohol, varnish, whip, or hat factory can properly be regarded as a healthy occupation. Experience has proved that it is work *carried on in a confined space filled with wood alcohol fumes and rebreathed air* that constitutes the chief danger to eyesight and to the general health. The varnishing of closets or small rooms with closed doors and windows, of beer vats, or the evaporation or burning of wood alcohol in a confined space have been responsible for a number of cases of blindness.

That the above truths may be further brought home to those interested in this subject, I quote a few previously published examples of death from the ingestion of some form of methylated alcohol.

"Sheridan Knowles, of Bridgeport, Conn., aged 45 years, a private in the United States Coast Artillery, stationed at Fort Terry, Plum Island, New York, died yesterday afternoon after drinking a quantity of wood alcohol. Knowles had been drinking heavily of late and made visits to New London, Conn., at every opportunity during the week. Each time he imbibed freely, and finally returned to the island for the first time Thursday. He was finishing his spree, and could not stop entirely from drinking liquor, so that the temptation to drink the wood alcohol was more than he could resist, although he knew well the deadly effects of the poison. He was the barber of the fort, and so had no difficulty in getting what he wished from the barber shop. He drank the wood alcohol, and inside of an hour was dead. This is the seventh case of wood alcohol poisoning at Fort Terry within a few months."³

"On the evening of Wednesday, August 31, an unknown

³ Jour. Am. Med. Assoc., October 22, 1904.

number of Indians of the Turtle Mountain Reservation went on a spree, and being unable to obtain the ordinary alcoholic beverages, secured a large number of bottles of 'Florida water,' and, it is reported in the papers, 'lemon extract,' and drank freely of them. Nine Indians died, most of them Friday morning, September 2, and a survivor is known to have become blind. Empty 'Florida water' bottles were found in the Indian encampment after the debauch. All who partook of the spirits complained of burning in the stomach and bowels, pain in the head, and slow pulse (as low as 43); the finger-nails and lips were blue and they finally died comatose. Investigation showed the fluids to be largely methyl alcohol."⁴

Cases of death and blindness from the drinking of fluids adulterated with methyl alcohol are not, however, confined to semi-civilized tribes. Well known examples of wholesale poisoning have occurred in New York City (where seventeen cases of death and blindness occurred as the result of a single debauch), Chicago, and other large towns. One of the most recent of these took place among some Southern boatmen, a number of whom died from the use of wood alcohol as a beverage during a spree.

Stromberg⁵ has told the story of the Dorpat holocaust which I have elsewhere⁶ translated and reviewed. In June, 1904, an unknown number of men and women celebrated the mobilization of the Russian troops in Jurjew by drinking what in Livonia is known as Kuntzen's Balsam, a popular domestic remedy composed of such fragrant herbs as rosemary, lavender, peppermint, etc., concocted with water and about 50 per cent. of grain alcohol. It is employed in Russia like some of our own domestic "liniments" for both internal and external use. It is on occasions also drunk in Russia just as some people in America, who, unable to obtain more legitimate beverages, drink all sorts of alcoholic mixtures, such as patent medicines, bay rum, cologne water, lemon extract, etc., that are notoriously concocted with more or less pure alcohol. Of course, when these fluids are made from ethyl alcohol a simple intoxication is the consequence, but when adulterated with "deodor-

⁴ Jour. Am. Med. Assoc., *loc. cit.*

⁵ Sechszehn Vergiftungsfälle mit Methylalkohol. St. Petersburg Med. Woch., October 8 and 15, 1904.

⁶ New York Med. Jour., *loc. cit.*

ized " wood alcohol, columbian spirits, union spirits, colonial spirits, or some other methylated product, death or blindness is the result in a large percentage of cases.

The amount of wood alcohol drunk by the Dorpat (Jurjew) victims was small. Probably the "balsam" was made up with columbian spirits imported from America. At any rate thirteen people died, mostly from the same symptoms, and at least three others (probably more) lived but became blind. The symptoms, to quote from the article in the N. Y. Medical Journal, in these cases correspond exactly with what we know from a wide experience in America of this poison to be characteristic of the toxic effects from imbibed deodorized wood alcohol in any of its forms. After the ingestion of the methylated balsam a nauseating, burning, bitter taste was experienced. This extended from the throat, along the esophagus to the stomach; the dose was not followed by the warm, comfortable sensation in the abdomen that follows the drinking of ethyl alcohol. The patients complained of depression, weakness, and of severe pains in the extremities (8 cases), headache (9 cases), and vertigo (8 cases). Although unsteadiness of gait occurred in most of the patients, seven of them did not present this symptom. The heat and discomfort behind the sternum increased, in 8 cases, to severe and even agonizing pain, in the stomach and breast. Shortly (generally in a few hours) after taking the poison a feeling of general weakness (12 cases), and drowsiness (6 cases) with chills (6 cases) were noticed. In the milder cases these symptoms were delayed, but as a rule they appeared at once or at the latest the day after drinking the poison. The patients were quite ill and could no longer go about their usual work. A sensation of chilliness came on and increased until a decided rigor resulted. In one case this symptom was succeeded by fever and sweating. The weakness and chilliness lasted several days and the languid sensation generally deepened into semi-unconsciousness. The patients soon betook themselves to bed and sank into a stupor from which they were, now and then, aroused by attacks of abdominal distress and vomiting (in 13 cases). In nine instances they complained of nausea, pains in the abdomen (12 cases), and difficulty of breathing. They almost constantly threw themselves from one side of the bed to the other in the vain hope of getting relief.

About this time the eyesight was affected, usually in the shape of a cloud before the eyes. This important diagnostic symptom was elicited in an unusually large percentage of the Dorpat cases, 12 in all. In two instances it deepened into complete blindness after forty-eight hours, without any preliminary clouding of sight. In two other cases the blindness gradually increased for five or six days. Complete amaurosis lasted from several days to a week. The ability to distinguish colors continued relatively late in the illness and either returned to normal or was entirely lost. The pupils did not react normally to light, but were in no case dilated *ad maximum*. Nevertheless, in two cases only were there undilated pupils. Twelve patients complained of severe pains and tenderness in the abdomen without diarrhea; the others experienced most pain in the lower extremities, alternating with cramps of the leg muscles. Pains in the eyes were infrequent, occurring in two cases only. The face, generally red with cyanotic areas, sometimes bore a suffering, sometimes an apathetic, appearance. In all cases there was no appetite, but generally much thirst.

Disturbance of breathing (10 cases) was far more noticeable than an abnormal pulse rate. It is likely that this early sign of methyl intoxication was due to pulmonary hyperemia. Although at first breathing was rather labored, the sense of oppression was not marked. However, it soon became difficult, irregular, and superficial; shallow breaths alternated with deep inspirations. Before long there was rattling in the throat, followed by coughing and expectoration of much fluid, foam-like sputum. Finally, there was general cyanosis (5 cases), the extremities exhibited a lowered temperature, and the whole body was covered with cold sweat. In some cases (5) complete unconsciousness set in half an hour to three hours before death; others (4) exhibited only stupor. Some patients were quite conscious at the time of death. Eight victims died within twenty-four hours after drinking the methylated balsam; two others were dead within forty-eight hours.

Cases of blindness from the absorption of methylated preparations chiefly by the lungs, are naturally not so numerous as those that are the outcome of its absorption through the stomach, but they are sufficiently well authenticated. In the investigations by Buller and myself in these instances of blindness we are able

to obtain histories of nine hitherto unpublished examples of amaurosis from inhaling the impure fumes of wood alcohol. The following is a case in point:

S. E. S.,⁷ aged 44 years, April 12, 1902, worked a whole day varnishing tanks in a brewery, using varnish which had been mixed with wood alcohol. In the evening when he left his work,—according to the statement of his physician, Dr. Brock, of Waynesburg,—he acted like an intoxicated man, and two hours later went into a comatose condition, which lasted twenty-four hours. When aroused the sight of the right eye was somewhat impaired and that of the left eye was entirely gone. His vision since then has improved considerably. The pupils on both sides are small (2 mm.) and sluggish. Tension is normal. Vision in the right eye= $\frac{15}{80}$. No glass helps. Field of right eye shows moderate concentric limitation; that of left a more decided contraction, and also a small complete central scotoma. The ophthalmoscope showed right disc hazy, left swollen and blurred at margins and vessels tortuous. Advised iodide of potassium, salicylate of sodium and nux vomica. June 24, 1904.—Did not see the man subsequently, but Dr. Brock, in reply to a recent note, states that the vision of the left eye in time failed entirely. He also states that soon after the poisoning he was taken with left-sided pneumonia, from which recovery was never complete. About six months ago tubercular trouble developed and ended in death June 8, 1904.

Another patient, A. H. S., a German, aged 35 years, strong and healthy, weighed 190 pounds. He was employed as a beer vat shellacer. During the winter of 1900-1901 he was engaged in his employment of varnishing the interior of ill-ventilated vats with shellac dissolved in wood alcohol. He began to suffer from loss of eyesight, and when seen by Dr. North his vision was $\frac{10}{200}$ and there was every indication of optic atrophy, the discs being very white. Abstinence from work and long-continued treatment brought about some amelioration of vision, but improvement of central sight did not extend beyond $\frac{20}{50}$.

The treatment of methyl alcohol poisoning and the blindness which sometimes accompanies it is very unsatisfactory. When one remembers the usual course of the symptoms and the alterations

⁷ Jour. Amer. Med. Assoc., *loc. cit.*

in the background of the eye that are responsible for the blindness, it is not to be wondered at that treatment is of little avail. As already indicated, the vision is often good for several days after recovery from the intoxication, then without warning even total blindness may set in. This is almost always followed after a few days or even weeks of blindness by more or less complete return of vision. Sometimes the improvement is very marked and sight may be found to be as good as ever. After a time, in spite of this apparent improvement (which is often attributed to the treatment followed) blindness once more returns, and this time it is as a rule permanent. The field of vision is nearly always contracted and absolute central scotomata can generally be found. The pupils are then widely dilated and do not respond to light or accommodation.

The organic lesion is an optic neuritis which is characterized in the early stages of wood alcohol poisoning and shows itself, as it does in other forms of this disease, in blurring of the outlines of the optic disc, slight swelling of the nerve-head, and congestion of the central vessels of the retina. The first onset of the optic neuritis generally coincides with the first attack of blindness. Coincident with the disappearance, or partial disappearance, of the optic neuritis we have the improvement in sight just referred to, but this amelioration gives place shortly afterward to more or less complete loss of vision, in correspondence with the setting in of a post-neuritic atrophy. Then the congestion of the optic papilla and vessels disappears and complete atrophy, as shown by a white or grayish nerve-head with contracted retinal vessels, is easily made out with the ophthalmoscope.

It can thus be readily understood why therapeutic measures in these cases are so very unsatisfactory. Some authorities claim that the use of pilocarpin sweats with potassium iodide is indicated in the early stages of optic neuritis and that, later on, strychnin in full dose hypodermatically has been of use.

The treatment of the general poisoning is early elimination of the methylated mixture by careful irrigation of the stomach, followed by continued stimulating and supportive treatment for several weeks. As a rule, however, the cases are seen too late to afford help of any value.

PREVENTION OF WOOD ALCOHOL POISONING

As I have on several occasions pointed out this is a subject that may well attract and hold the attention of the profession. In spite of labeling methylated products "Poison" (with the familiar skull and cross-bones), cases of blindness and death continued to result from the wide-spread employment of columbian spirits and other forms of deodorized wood alcohol. In my judgment, either the sale and manufacture of "deodorized" or "purified" wood alcohol should be absolutely prohibited, or, as in Germany and Great Britain (countries that are entirely free of poisoning from these preparations) an untaxed ethyl alcohol, or one rendered undrinkable by the addition of mineral oil, wood spirit, naphthalin, or some other nauseous compound or compounds, should be allowed for use in the arts. In the countries mentioned millions of gallons of grain alcohol, that can be manufactured for less than 20 cents a gallon, are annually employed for commercial purposes. The Internal Revenue receipts have not suffered, either in Germany or the British Isles, from the use of untaxed alcohol, and there is no reason why we in America should continue to have hundreds of cases of blindness and death from the employment of an agent that possesses no advantages over the British "methylated spirits," or the commercial *Brennspritus* of Germany. Most of the manufacturers in this country are in favor of ethyl alcohol for commercial purposes, and it is believed that a considerable impetus would be given to a number of worthy manufacturers if it were possible to obtain alcohol at the same price as the deodorized methylated product. The retail price of "purified," untaxed, wood alcohol is 50 cents a gallon, while the same amount of ethyl alcohol is \$2.60 a gallon. Yet ethyl alcohol sufficiently pure for all commercial purposes, could be sold at a considerable profit, if untaxed, for about 30 cents a gallon. Until Congress realizes the wisdom of giving her citizens commercial, untaxed alcohol at a reasonable rate, every medical man should insist upon the poisonous character of all "deodorized" alcohols, which, under fanciful names are so extensively employed to intoxicate the people of this country.

Surgery

A METHOD OF LENGTHENING THE ACHILLES TENDON AND OTHER TENDONS

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EXPERIENCE has proved that a subcutaneous division of the achilles tendon is the simplest method of lengthening that tendon, and there is no doubt that the tendon reunites after its division. It is not certain, however, that the structure serving to unite its divided ends is sufficiently unyielding to resist the enormous force exerted upon it by the active calf muscles, or that the amount of lengthening secured by this means may not be sufficient to modify seriously the function of the calf muscles.

The latter consideration led me, some years ago, to look up all the cases at the New York Orthopedic Hospital in which a subcutaneous division of the achilles tendon had been done during the previous ten years.¹ The result of this study was most surprising, as it was found that a large percentage of the patients had such serious modification of the calf muscles that they were no longer of any value in walking. The tendons were much exaggerated in length, small, and poorly shaped, showing that while the patients presented good results upon discharge from the hospital, during the years which had elapsed, the structure serving as a bond of union between the divided ends of the tendon, had gradually elongated, until the shortening of the calf had reached such a point that the muscles were no longer effective in extending the foot.

These results seemed to be due to two considerations: (1) There was no tendinous structure left to form a bridge between the divided ends of the tendon and to limit the extent to which those ends would separate; and (2) the sheath was divided by the subcutaneous operation and its effect on the reparative process destroyed.

This suggested that the structure uniting the divided ends of the tendon, was not tendinous and therefore not sufficiently unyielding to resist the force exerted upon it by the muscles. Three of these patients were operated upon and their tendons shortened.²

It was clearly evident in each case, upon exposing this structure, that it was not tendinous; it presented no appearance of tendon and in no instance could any sheath be found.

This led me, in 1899, to devise the operation which is the subject of this article and which was described in a paper read before the Orthopedic Section of the Academy of Medicine, of New York; March 6, 1900, on which occasion I exhibited ten patients showing the results.³ At that time I was not aware that a similar method of lengthening this tendon had been used. Since then I have learned that Sporon in 1891 used a similar method; mine differs, however, in one important particular, namely, the preservation of the sheath, since Sporon nowhere suggests that its preservation is of importance.⁴ The operation as I have performed it is as follows: an inch-and-a-half or a two-inch incision is made to the outer side of the achilles tendon. Upon exposing the sheath, it is split for the same distance, exposing the tendon. With a blunt pointed retractor the tendon is lifted and lengthened. With a tenotome an incision is made through two-thirds of the thickness of the tendon, one half inch from its insertion, and from this point the knife is turned and the tendon slit upward longitudinally a certain distance. One quarter of an inch above the end of this incision, another transverse incision through two-thirds of the thickness of the tendon is made, from the opposite side and from this point the tendon is split downward, to within one quarter of an inch of the first transverse incision. By this means the tendon unfolds in a manner which secures its lengthening and at the same time preserves its continuity. The length of the two longitudinal incisions should depend upon the amount of lengthening desired, since the amount equals the length of those two incisions, minus the quarter of an inch lap which occurs.

The tendon is now allowed to fall back into the sheath, which is brought around it and secured by small continuous catgut sutures. It will be found that in correcting the deformity of the foot, thus utilizing the increased length of the tendon, the sheath is not torn, the slightest amount of injury having been done,—simply that of the longitudinal incision.

Fig. 1 is from a photograph of the foot in a position of equinus, prepared for operation. Fig. 2 shows the skin and sheath retracted, exposing the tendon. Fig. 3 shows the tendon lengthened and the deformity corrected. Fig. 4 shows the sheath closed over the tendon with its calibre undiminished. Fig. 5 shows the wound closed.



FIG. 1.—The foot in the position of equinus prepared for the operation.



FIG. 2.—The skin and tendon sheath retracted.



FIG. 3.—The method of dividing and lengthening the tendon and correcting the deformity.



FIG. 4.—The closing of the sheath over the tendon.



FIG. 5.—The cutaneous wound closed.

These figures are made from photographs of a patient operated upon on April 10, 1900, and show the various steps of the operation.

Since using this method about 200 patients have been operated upon. It has been used in all cases at the New York Orthopedic Hospital, in which, in lengthening tendons, it was desirable to preserve the function of the muscle—not only in connection with the achilles tendon, but also with the hamstring tendons, tendons of the forearm, etc.

It has been noted in every case that after the healing process is complete the tendon is large, well shaped, and in no instance has it shown any tendency to elongate. A sufficient length of time has elapsed—six years in the earlier cases—to make it reasonably certain that no such result will follow the operation.

In considering the merits of the two methods, it is important to remember that in all cases in which the lengthening of the tendon is necessary, the shortening of the muscle creates that necessity, not, as is often stated, a shortening of the tendon, and that by so much as the muscle is shortened, is its action modified—not the power of its contraction but the arc of contraction, and that any method by which the tendon is lengthened still further shortens the muscle. Therefore, in such patients as have deformity which can only be corrected by the lengthening of tendons and in which it is important to preserve the function of the contracted muscles producing the deformity, it would seem important to use that means of lengthening which is most accurate and which will insure an unyielding tendon.

The disadvantages of subcutaneous tenotomy are, that the lengthening is not accurate, since the retraction of the proximal end is uncontrolled and with the displacement of the distal end in the correction of the deformity, necessitates a greater increase in the length of the tendon than is desirable, and the injury to the sheath impairs the healing process, while by the open method here suggested, the lengthening of the tendon may be absolutely accurate, its continuity preserved and the sheath uninjured, so that the modification of the muscle is slight and the reproduction of an unyielding tendon certain.

¹ Subcutaneous Division of the Tendo Achillis. New York Medical Journal, July 19, 1902.

² The Tendo Achillis Shortened. New York Medical Journal, May 2, 1903.

³ Medical News, April 21, 1900; Lancet, November 3, 1900.

⁴ On tendoplasty, Hospitalstidende, 3d series, vol. ix, No. 50, 1891.

GONORRHEAL SYNOVITIS; CARCINOMA OF THE PYLORIC END OF THE STOMACH

A SURGICAL CLINIC HELD AT THE PRESBYTERIAN HOSPITAL, CHICAGO

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GONORRHEAL SYNOVITIS

GENTLEMEN: While another patient is being anesthetized. I will evacuate and inject a gonorrheal knee-joint. The patient is a sailor who contracted specific urethritis a long time ago, and now has a gonorrheal synovitis of one knee-joint that has resisted all medicinal treatment resorted to up to date. I fear that in this case the nature of the synovitis has been overlooked.

There are only two agents in which I place any confidence in the management of gonorrheal synovitis with effusion, and these are tapping and antiseptic intra-articular medication and the internal administration of potassium iodide—the latter suggested and extensively used with the most brilliant success by Prof. Max Schuller. I have reason to believe that one or two punctures, followed by irrigation, and the injection of a 3 per cent. solution of carbolic acid (which I usually find is strong enough) will bring about a permanent change for the better; I shall not call it a cure.

The physical evidences of a moderate effusion into the knee-joint being quite evident, I select a point for puncture along the outer border of the patella near its upper margin. I slide the skin to one side, make pressure over the inner aspect of the joint, tilt the patella, and insert the trocar at the point indicated, pushing through the skin in the direction of the center of the patella where the instrument rests,—so that I am in the cavity of the joint. I withdraw the stylet, and as you see, I am evacuating what I expected, a moderate amount of ordinary synovial fluid.

There are no flocculi in the fluid. I make compression so as to evacuate the joint as thoroughly as possible. By tilting the cannula downward the escape of the fluid is free.

Examining the fluid we find it mixed with a little blood, whence I judge that the synovial membrane is very vascular, and that the hemorrhage was undoubtedly caused by puncturing some of its small vessels.

I now have in readiness the ordinary injection apparatus charged with a 3 per cent. solution of carbolic acid; having connected it with the cannula, I watch the column, being careful not to inject any atmospheric air. Having now injected the carbolic acid I wait to see if any fluid escapes. If not, I shall allow the carbolic acid to remain in the joint, withdraw the cannula, and seal the little puncture with collodion.

CARCINOMA OF THE PYLORIC END OF THE STOMACH

The patient who has now been anesthetized and upon whom I purpose operating was presented at the last clinic with a diagnosis of carcinoma of the pyloric end of the stomach. In the event of the diagnosis being found correct, I expect to perform either a pylorotomy, if I find the disease limited to the organ primarily affected, or a palliative operation if I find that the disease has extended to the adjacent organs or has given rise to diffuse local metastasis through the lymphatic glands.

One feature in the case is somewhat obscure. Judging from the size of the palpable tumor, I am astonished to find so little evidence of mechanical obstruction. Vomiting has not been persistent or constant, and it has not been influenced by different kinds of diet. The patient is a very bad subject, indeed, because the disease has produced general changes that are not very favorable for the performance of any major operation. He is extremely anemic, a matter that we have taken into account in preparing him for the coming ordeal. It is in such cases that we are always fearful of the immediate effect of the operation in producing serious, if not fatal, traumatic shock. We have administered, since yesterday, rectal enemas of normal physiologic solution of salt, one of the agents that we rely upon largely in the prevention and treatment of traumatic shock.

While the patient is under the influence of the anesthetic I can grasp the tumor mass very satisfactorily; I find it occupies the region of the pylorus and of the gall-bladder. I shall make a diagnostic incision, because we are not absolutely sure of the exact anatomic location of the disease. In all probability we shall find pyloric carcinoma, but this tumor mass may be a distended gall-bladder. Let us hope it is the latter. I shall make the incision in the median line, and if we find carcinoma of the pyloric end of the stomach, it is through this incision that the operation will be performed. If I find it is a case of gall-bladder distention, the result of disease of the gall-bladder, I shall then close the first incision and make the usual incision directly over the enlarged gall-bladder. In exposing the stomach for operative intervention, particularly in performing gastroenterostomy, I invariably make the incision through the median line, extending from the tip of the xiphoid cartilage to the umbilicus. In this case I have cut through the skin to the umbilicus and to its left side; that is about the line of the incision I usually make. I can enlarge the incision should it become necessary. I now divide the different layers of the abdominal wall until I am down to the aponeurosis of the recti muscles, which I now incise and expose the remaining structures. Our incision is about two and a half inches in length, sufficiently large for diagnostic purposes. I now pick up the peritoneum between two dissecting forceps, open the peritoneal cavity, and at once grasp the parietal peritoneum on each side with hemostatic forceps to prevent its retraction. I have an opening about an inch in length, which I will enlarge sufficiently to enable me to explore the stomach and its adjacent organs. The anterior wall of the stomach is visible in the incision. I draw the stomach forward, palpate, and can assure you now that the diagnosis of carcinoma is correct. It is a very large tumor indeed, involving the pyloric end of the stomach, and I am already convinced of its malignant nature by the presence of considerably enlarged lymphatic glands underneath the visceral peritoneum. We shall therefore find in making the opening larger that, according to the indications, it will be necessary to limit operative procedures to palliation. There is decided lymphatic metastasis.

Having made an absolute diagnosis, I shall now enlarge the

incision to the requisite extent for the remaining steps of the operation. I carry the incision a little to one side of the umbilicus and enlarge it a little in an upward direction. We must therefore be content in performing a gastroenterostomy. The stomach is greatly dilated. I am able to show you a carcinoma of the pyloric end of the stomach—now visible in the upper angle of the wound. The coats of the stomach are drawn inward. I find a large carcinomatous nodule outside of the pylorus. This extensive lymphatic infiltration precludes a radical operation. I reduce the stomach. I must find now the intestinal loop, which I shall bring in communication with the stomach. The next organ I shall meet with is the transverse colon, which I now hold between my fingers. I shall look for the small intestine lower down, and while looking and feeling for the intestinal loop I feel a number of large lymphatic (retroperitoneal) glands behind the stomach. You see the transverse colon and the large omentum, and I show you a loop of the small intestine. I want to be sure to make the communicating opening as near the stomach as possible. I shall ask the assistant to take hold of the intestine, and I have now in my grasp the upper part of the intestinal canal. I inspect the intestine, draw it forward, and trace it in one direction. If the intestine becomes smaller and smaller, I have reason to believe I am tracing it in a downward direction, so I will go on the opposite side. I examine loop after loop and find that the intestinal wall, if anything, becomes thinner, and what is very characteristic, more vascular, and contains more of the intestinal contents. We shall travel over some twenty or thirty inches of intestine, which is a matter of considerable importance. I have traced the intestine down to the ileocecal valve, so we must proceed now in an upward direction.

In many instances gastroenterostomy has proved a failure because the communicating opening was made in the wrong place, too near the ileocecal valve. I am particularly anxious, as you doubtless observe, to find the proper intestinal loop, because it has happened to many surgeons that patients have died afterward of inanition, and post-mortem examinations have disclosed an opening near the ileocecal valve. Hahn has taught us how to grasp the proper intestinal loop by looking for and finding the duodenal fold.

I have never been able to do this, although he does it and is an expert in that matter. The average surgeon will find it necessary to eviscerate to a certain extent in order to locate the desirable loop of bowel between which and the stomach the anastomotic opening should be established. We are now, however, at a point very close to the stomach, as is apparent from the appearance of the intestine, which is less vascular, and is almost, if not entirely, empty. Having found the proper intestinal loop, we shall now establish between it and the stomach the communicating opening. I want the assistant to be careful to keep within grasp the distal side of the knuckle, between which and the stomach I am now going to establish the anastomotic opening. This becomes important when I anchor the bowel to the stomach, if it is done properly. I bring the stomach forward; the intestinal loop is secured. The transverse colon will now be reduced as well as the great omentum, with which I shall cover the transverse colon and bring the stomach forward for the remaining steps of the operation. The stomach is very much dilated; its walls are slightly thickened, a condition established by exaggerated physiologic function in consequence of the effects of the long-continued mechanical obstruction. The assistant will now hold the stomach forward with the other hand, and I shall try to establish a communicating opening at a point a safe distance from the carcinoma and near the greater curvature. We replace all the remaining abdominal contents we have explored, bring the intestinal loop forward, and I will now follow Lauenstein's practice and first suture the intestinal loop to the anterior wall of the stomach.

I have selected for the visceral incision of the stomach a point at least three inches from the seat of the carcinoma. I shall suture the bowel to the stomach as a preliminary step preceding the visceral incision. With the ordinary cambric needle, armed with fine silk, I now take the necessary number of Czerny stitches, using for this purpose the interrupted suture, because, after all, we rely upon interrupted sutures in securing accurate coaptation between the approximated serous surfaces. I take one stitch after another, about one-third of an inch apart, including in the grasp of the needle all of the tunics except the mucosa. This is very readily done in suturing the stomach, but it is not so easy in suturing the

lower segment of the small intestine, the wall of which is very thin; surgeons occasionally penetrate the thickness of the abdominal wall, in which event, there is likelihood of the escape of intestinal contents and the inevitable consequence—septic peritonitis.

We have now exposed the minimum structures necessary in performing this operation; as you observe I am extremely anxious to keep all of the viscera within the abdominal cavity so as to guard against undue loss of heat during the operation, which will necessarily be somewhat prolonged. I have already sutured about an inch and a half; and I would like to have you notice particularly that in performing this anastomosis with needle and thread, I purpose suturing the intestine to the anterior abdominal wall for at least four inches for a distinct purpose. Many surgeons have been chagrined, after performing this operation, to find that the food subsequently taken by the patient is vomited, and that the clinical symptoms for which the operation was undertaken were greatly aggravated. This is due to the formation of a spur at the opening. This spur is in such a location that the stomach contents enter the proximal end of the intestine in the direction of the stomach, causing intestinal obstruction. To prevent the formation of such a spur I take the necessary precautions and measures to guard against the formation of a flexion, and this is done most efficiently by extensive suturing of the intestine to the stomach. I shall here make a junction of at least four inches in length. Be sure, in making intestinal anastomosis, to precede the visceral incisions by the junction by means of a row of Czerny sutures of the organs with which you wish to establish a communicating opening. Very little time is lost, because these sutures will be utilized in the formation of the anastomotic opening.

You will observe that I am not using any clamps either for the stomach or the intestine. I consider such mechanical contrivances in performing this operation as superfluous, or in the way. When we open the stomach and upper part of the intestinal canal in making our incisions, we find the organs are not completely emptied. There is no need for such mechanical barriers as clamps or tying the intestine above the proposed line of visceral incision. We have made a row of Lembert stitches, and are now ready to make incisions into the stomach and the upper part of the ileum near the

junction of the ileum with the jejunum. It will hence be a gastroileostomy. You see now the junction as we have made it so far. I shall pack off the abdominal incision carefully, so that there will be absolutely no possibility of the entrance of material which might escape from the stomach or intestine. I shall make the incision without any fear of contaminating the peritoneal cavity. I shall first make the incision in the stomach, and I am doing this at a point a safe distance from the sutures that have already been inserted, making the incision two inches in length. Notice what happens now. I have incised the serosa and the muscular coat. The mucous coat projects from the incision with the large vessels between the muscularis and the mucous coat. I grasp now the mucous coat, and through the incision made I am in the stomach. I shall enlarge the opening through the mucous coat to correspond with the size of the external incision. The incision will be two inches in length. The stomach is practically empty. The small amount of fluid that escapes is now caught in the sponge. What escapes is more blood than anything else, because the stomach was carefully washed out prior to the administration of the anesthetic. My finger is now in the stomach. I will explore the pylorus. I am within reach of the carcinoma. I touch the carcinoma; I find the pylorus hardly permeable. I can not insert the tip of my index finger into it, and I doubt if I could introduce the tip of my little finger. The pylorus is almost obliterated. I make a visceral incision in the bowel. Notice how the mucous membrane becomes everted. I will now make an incision in the ileum; I hold the everted mucous membrane a little to one side, and now incise the bowel to the same extent as the stomach. I have cut down to the mucous membrane, which already bulges into the wound, which will be picked up with forceps and incised separately. We hold up now the mucous membrane which I shall incise. I have opened the intestine and find that it is practically empty. The incision in the bowel is two inches in length, corresponding with the length and location of the visceral incision in the stomach. The Lembert stitches are already in place behind the visceral incisions. All I have to do now is to suture everything with the exception of the peritoneum. This will be done. I bring the two angles first together, and I use for this purpose the

same needle. I take the angle of the wound in the small intestine and the angle of the wound in the stomach and bring them together. You will see the application of my first Czerny stitch; then we have to suture the corresponding mucous margins together. You will notice that the mucous membrane of the stomach bulges beautifully. I grasp the mucous membrane of the ileum, now of the stomach, and as I am suturing a ridge forms which projects into the lumen of the stomach and the ileum. The mucous membrane is everted on both sides, forming a ridge, and in that position we now suture them together. The Czerny sutures can be tied quite tightly, while the serous stitches must be tied with sufficient firmness to approximate the serosa. The deep stitches will cut through and be eliminated with the feces through the alimentary canal.

We are not working for time in performing this operation. Suturing of the stomach is a delicate and important task; every little mistake that is made in the technic of the operation might prove serious, hence great care is necessary. I am approaching the opposite angle of the visceral incisions. I place the sutures close enough so that the two rows shall absolutely preclude the escape of gas or fluid. One more stitch and the posterior suture will be completed. Watch carefully what follows next. I am taking exactly the angle of each wound. The stitch resembles the first in every respect. Here is the exact angle. In suturing in front I have first to apply the Czerny stitch. The deep suture is applied first; I turn the opposite margin of the visceral incision. I am now inserting the deep stitches in front, and now I insert the Lembert stitches. Remember, behind is the preliminary row of Lembert stitches introduced before making the visceral incision, the deep row of Czerny stitches being in front. I am bringing together the mucous membrane. The wound is in excellent position for easy and safe suturing. I am to exclude the serous surface, which is more readily done on the stomach side than on the side of the intestine. I grasp the margin of the bowel so as to insert the sutures properly, placing them about every third or fourth of an inch. You will see, when I complete the first row of anterior sutures, a space between the mucous membrane and the muscular coat. We will bury the deep sutures with superficial or Lembert stitches.

These should be cut short, because if they should project they would act like capillary drains and become a source of danger. They must be buried completely out of sight. I have sutured about one-half of the wounds now.

I am in the habit of making the opening very much larger now than when gastroenterostomy was first performed. We have learned clinically that these openings are liable to become constricted, so that the opening should be at least two inches in length, and in this case I have such an opening. In suturing I am careful to distribute the wound margins properly, so that there will be no folding of any portion of the intestinal wall or the wall of the stomach. It must come out evenly. You can see very nicely the mucous membrane on both sides. I am approaching the angle of the wound and here is the important point where the greatest mistakes are made. Accurate coaptation is so essential, because leakage is most liable to occur at the angles of the visceral wounds. I will see if this suturing has been properly done. I find no signs of mucous membrane; the deep sutures are properly placed, and what you see now is the margin of the mucous membrane and the muscular wall. We shall begin to insert the Lembert stitch. I must have a clean needle and a clean thread, because we have been working on the lumen of the two organs. Our suturing extends far beyond the limits of the incisions made, and I shall begin to suture now at a safe distance. Watch me carefully. The first stitch will be inserted at the point I show you. These are the typical Lembert stitches. I cross the space, grasp the stomach, and bury step by step the deep row of sutures. The Lembert suture is about the size of a silk suture. I transfix the wall minus the mucous membrane in this way, cross the space, enter the wound in the stomach one-quarter of an inch away from the margin, transfix, and tie. You see how beautifully the margins of the wounds are becoming coaptated. I do not want to puncture any of the blood vessels, so I cross at this point (indicating) and pick up the wall of the stomach, being careful to go deep enough, but not too deep, so as not to enter the lumen of the bowel. In teaching intestinal suturing, I find that students make the mistake of penetrating the bowel more frequently than any other. I am bringing together now the serous surface. The advice to avoid the subserous blood-

vessels is very important, because, if I should puncture one of those large veins and meet with hemorrhage, it might be difficult to control. Notice how beautifully the sutured mucous membrane is shut out of sight by the Lembert stitches. The work of suturing is nearly completed.

When you do this operation be sure to have a long needle like the one I show you. Long needles are more easily handled than short ones. While the needle I am using is a little short, it nevertheless answers the purpose admirably. Here, again, I avoid blood vessels of considerable size. I have made very little use of dissecting forceps, because the surgeon who relies on the needle in inserting Lembert stitches has very little use for forceps.

We are approaching now another angle of the wound. This operation ordinarily can be done in about twenty-five or thirty minutes, but I am taking additional time for the purpose of demonstrating to you the different steps of the operation. The stomach should now be drawn down a little, because I want to suture beyond the angle. The wound is nearly closed. I take a stitch here (indicating), grasp the stomach, and have reached the angle of the wound. The wounds are safely sutured together, but to enhance the effect of suturing, to prevent flexion of the bowel at the point of the communicating opening, I insert one or two additional sutures beyond the angles of the wounds. I will look the ground over once more; all that I have left is one more stitch beyond the angles of the wounds so as to have a long straight piece of intestine with the communicating opening to prevent spur formation and the establishment of what has been described by the Germans as the "vicious circle."

The operation now is completed. I shall wash the parts with hot saline solution before reduction. The intestine is now full; gas has entered from the stomach into the intestinal loop. There has been little, if any, contamination, but nevertheless I wash the parts thoroughly with gauze sponges moistened with hot saline solution. I am ready to remove the compresses and then reduce the sutured viscera. That is done in this way: Here is the large omentum; I reduce first the stomach, now the intestinal loops, and spread over them the great omentum. Reduction has now been made. I ask the assistant to remove the compress with which we prevent the

escape of the abdominal contents, and then I shall be ready for the suturing. This compress keeps the parts in perfect position. The assistant will now insert the deep sutures of silkworm-gut, including everything with the exception of the peritoneum. The peritoneum will be sutured separately with fine silk, and the sheath of the recti muscles with catgut of medium size. The interrupted sutures will be tied, and finally the skin will be united with horsehair sutures, after which we shall apply the usual absorbent aseptic compress bandage.

SOME OF THE EFFECTS OF QUIET RENAL CALCULUS

A CLINICAL LECTURE DELIVERED AT ST. THOMAS'S HOSPITAL, LONDON

BY WILLIAM HENRY BATTLE, F.R.C.S.

Surgeon to St. Thomas's Hospital, London

GENTLEMEN: In a recent clinical lecture the opportunity was taken of discussing the symptoms and treatment of renal calculus, and several stones were shown which had been removed in consequence of some symptom or symptoms which had caused the former possessor to seek for operation. In most of them pain was the most marked and characteristic symptom; in the majority hematuria was present or had caused alarm before admission; in one it was the only symptom, and had been going on for three years. In some there was pyuria also, whilst in one patient, in addition to symptoms which were unmistakable, the stone could be easily felt through the abdominal wall. In all of these it had been possible to save the kidney by a timely operation, with the exception of the patient in whom the stone could be felt, and who subsequently required nephrectomy.

I have no doubt the subjects of renal colic thought it very hard that they should be compelled to suffer so much from their trouble, but in reality the symptom which they found least endurable, the pain, was a blessing in disguise, for it compelled them to seek relief before the kidney had sustained irreparable damage. I have here to-day some patients who have recently been under treatment in the wards of the hospital for kidney disease, in whom the cause was a calculus, and in whom its presence was unsuspected before the damage inflicted on the containing organ was beyond remedy. In them the stones were "silent" or "quiescent," and destruction went on gradually until a time arrived when, aided by septic infection from without, the disease asserted itself. The effect of such quiet stones on the kidney is not infrequently found in the produc-

tion of a pyonephrosis, and although this disease has long been recognized as occasionally due to silent stone, it is always a subject of interest to the surgeon to find calculi present which, from their size, must have been in the renal pelvis many months before they caused sufficient change to attract attention. The operation for the removal of renal calculus is such a safe one that we can hardly imagine the mental state of a patient who can support the active symptoms of a renal calculus from year to year and refuse surgical aid. Such people are, however, to be met with. Occasionally they seek for assistance when the renal tissue is already destroyed, perhaps on both sides, and it is too late.

CASE I.—The first patient to whom I ask your attention is a married woman, aged 26 years, without children, who was transferred to Beatrice Ward on October 24, 1903, from Christian Ward, where she had been under the care of Dr. Hector Mackenzie from September 3. From notes by Mr. Cassidy it appears that there was nothing important in the family history or in the past history of the patient beyond an attack of pleurisy and pneumonia six years ago, and an attack of hemoptysis in January of this year. Three years ago she suffered from painful micturition, the pain sometimes lasting as long as five hours after passing urine. She has also suffered from frequent micturition, having to get up four or five times a night since she was a child. She has been treated for "floating kidney" when she suffered from pain in the small of the back and right lumbar region, more marked on exertion. She was in another hospital from May to July, 1903, and was treated for cystitis and pyelitis. She went to Hastings for a fortnight; was then an outpatient for treatment at St. Thomas's, without improvement.

On admission, the patient, who presented a chronic eczematous eruption on the face, was somewhat thin, and only complained of frequency of micturition. The right kidney was enlarged and could be easily felt; it was also tender. She complained of tenderness in the bladder. There was nothing abnormal in the chest. The urine was acid, contained pus and a large deposit of albumin. No tubercle bacilli were found. There were no night sweats, and the temperature was normal.

September 12.—Examination of the bladder showed it to be healthy. Urotropin was administered, and she was kept in bed.

Under treatment the suprapubic and renal areas of tenderness became less evident, but the amount of pus continued to be considerable. The kidney was examined for calculus by the x-rays, but nothing was discovered.

The operation of nephrotomy was performed through the loin on October 20. The pelvis of the kidney was dilated, contained pus and a calculus. This was found at the entrance to the ureter. It was shaped somewhat like a spear-head, and consisted of oxalate of lime with a coating of phosphates. A drainage tube was placed in the kidney.

On October 26, the urine had a specific gravity of 1032, contained a considerable quantity of pus and a faint trace of albumin, a few hyaline casts and some bladder epithelium, but no blood. On October 31, the urine had a specific gravity of 1021, was acid on resection, and showed a slight deposit of pus, but no albumin.

She was discharged at her own request on November 24,, with the wound quite healed, and only a trace of pus in the urine.

The patient was readmitted on January 1, 1904. She stated that she had had more or less pain in her right loin since her departure from the hospital. On December 27 the pain was very acute; she had a severe paroxysm (this pain was more severe after exercise and limited to the right loin). The urine was acid, and showed a considerable deposit of pus. Micturition was very frequent and very painful. She improved so much after the use of urotropin and rest in bed that she declined to have any operative treatment, and left on January 30.

She attended the hospital from time to time, but the pyuria continued, and she had pain in the right side. When readmitted, on April 29, the right kidney was not felt on palpation, although the abdominal wall was flaccid. The urine had a specific gravity of 1020, was acid, and had a heavy deposit of albumin and pus. On May 7 she had been unable to sleep during the night on account of pain in the side.

On May 10 the right kidney was removed through a lumbar incision, which followed and extended the scar already there. The kidney was adherent to the old wound, but it was not difficult to separate it from its bed after the contained pus had been removed. It was brought into the wound and the pedicle clamped. There was

a good deal of fat around the renal pelvis, but no vessel required to be tied when the clamp was removed. The ureter could not be found. Deep and superficial sutures were inserted, and a drainage tube put in the wound. The kidney measured about 6 inches in length, and was irregularly distended; it contained pus, but no calculus. The entrance of the ureter was almost obliterated. Microscopic examination of the wall showed both acute and chronic inflammation of the renal substance, with amyloid degeneration. Operation was followed by a sharp attack of "ether bronchitis," although the operation had not been prolonged; the temperature on the third day rose to 103° F. The wound did not suppurate, and she left the hospital on June 3, when it had been closed for a week. The urine is now clear, and micturition is neither painful nor frequent. She looks well, and says she has never felt better in her life.

In this patient, frequent micturition with pyuria in acid urine were the only evidences of calculous pyelitis for a long period. During this time inflammatory changes were taking place around the calculus to such an extent that the opening into the ureter became contracted until it was quite inadequate. The removal of the stone did little to improve the pyonephrosis which had ensued, although it did not appear excessive or beyond repair at the first operation. Probably the contraction continued after the source of irritation had been removed.

CASE II.—In another patient, now on his way home, the diagnosis of the presence of a calculus as cause for the pyonephrosis was not so difficult, and one was found at the operation. The appearance of this stone suggested the strange probability that it had formed part of a branched larger one, and if so it must have remained in the kidney for at least ten years. At last it produced symptoms, but the kidney had been most thoroughly destroyed, and nothing short of excision was left for the surgeon to do. If the theory that the stone had been there for ten years is correct, it is difficult to understand why it had produced no renal pain, considering the patient was an active and hard-working man. It is not possible to say how much destruction had been wrought by the calculus removed at the former operation.

J. H., a joiner, aged 37 years, who had been sent home from New Zealand, gave the following history, for which I am indebted

to Mr. Orlebar. Ten years ago he noticed blood in his urine, and had pain in his right side. The pain was intense, lasting 5 to 6 hours, and he was delirious. He had several attacks of pain (evidently renal colic). He went to a hospital in New Zealand, where they opened his side and put a tube in it. The wound closed in six weeks, and he kept well until the present attack. Twelve months ago he noticed that his urine was becoming thick. He consulted a doctor about this, but there has been no change. When on the voyage home, six weeks ago, he had an abscess of the right kidney, which was opened, and for some time discharged freely, the discharge gradually getting less.

When admitted to St. Thomas's Hospital, on July 16, 1903, the urine was still thick, contained a considerable amount of pus, was acid, and had a specific gravity of 1024. There was no pain, but he complained of increased frequency of micturition, and there was tenderness on pressure over the kidney which was somewhat enlarged. His temperature was normal, and there was nothing discovered on examination of the other organs.

On the 24th, nephrotomy was performed, and some pus evacuated from the pelvis of the kidney; that organ itself was very hard and the tissue around it much thickened. The pus, though not large in amount, was very offensive. No calculus could be felt, so the kidney was drained after it was washed out with 1 in 2000 mercury perchloride solution, in the hope that it might close satisfactorily. This hope, however, was not fulfilled, as the discharge continued in varying quantities from the wound, and although there was less pus in the urine the quantity was still considerable at the beginning of October.

Nephrectomy was performed on October 6, the operation being a very difficult one on account of the firm way in which the kidney was embedded in the changed structures around it. After freeing it the pedicle was clamped, the kidney separated beyond, and a thick ligature applied. The wound was closed and drained toward the posterior part.

The structure removed consisted of a mass of fat and fibrous tissue with the remains of calyces. No renal substance was left. The atrophied ureter ran into this mass, as did a diminished renal artery. A small calculus, the size of the tip of the little finger, evi-

dently a portion of a larger branching one, and composed of gritty phosphatic material, was found in the pelvis of the kidney.

The patient made a rapid recovery, and left the hospital on November 2. The urine was quite normal, the wound healed, and he was regaining strength very quickly.

CASE III.—In another patient there was a complete absence of symptoms of stone in the kidney affected. The patient noticed that the urine was thicker than usual, and that there was a tumor in the abdomen. She is, as you perceive, a stout, well-nourished, healthy, strong-looking woman, with a good color, and, although looking better and stouter now than she did at the time of the operation, still she never gave any suggestion of tuberculosis. Yet the insidious origin of the disease made it advisable to examine the urine with the view of eliminating tubercle as a probable cause. There was no question of trying to save the kidney; it was too extensively diseased to permit of anything less than complete removal.

A. M. G., a married woman, aged 49 years, was admitted under the care of Dr. Hector Mackenzie, on July 23, 1902, and transferred to Beatrice Ward on August 12. From the notes by Mr. Parry it appears that the family and previous medical history was good. She stated that in January, 1902, her periods stopped, and she thought that she was pregnant; she was in her usual health. In May she noticed that her urine was thicker than usual; subsequently she felt a swelling in her left side. She never had any renal colic, and has never passed stone or gravel in the urine. She has no pain. On examination, the patient was a stout woman of short stature, with a fat and lax abdominal wall. There was no complaint of pain and no tenderness. In the left flank a large tumor could be felt between the hands. It extended upward above the costal margin and downward below the iliac crest; the hand could be inserted both above and below the tumor. It caused a fulness in the flank when viewed from behind; the surface was lobulated and firm, but not tender; it could be moved to a limited extent in all directions. The right kidney could be felt, and was movable. The temperature, 99.6° F. The urine had a specific gravity of 1020, and contained a considerable quantity of pus.

A specimen of urine examined in the Clinical Laboratory for

tubercle bacilli gave a negative result. By August 12, there had been no change, and the temperature ranged from 98.4° to 100.4° F. On that date the kidney was explored and afterward excised through the lumbar region. There was not much room between the ribs, and from the stoutness of the patient the kidney was deeply placed. On exposure it was punctured with a trochar and cannula, and a few ounces of offensive pus withdrawn. The kidney was then separated from the surrounding adhesions, a by no means easy task, for they were very firm, requiring in some parts the use of the scissors. More pus escaped during the operation. The vessels and the ureter were secured with strong silk, and the tumor was removed. The kidney was irregularly dilated into many chambers, and a good deal enlarged; in one of the calyces communicating with the main chamber was a calculus. During the process of separation of the lower part of the kidney, where the adhesions were especially firm, an opening was torn in the peritoneum to the inner side of the colon; this was about 4 inches long, and required suturing after the cleansing of the peritoneum, some clot having passed through it when the patient was lying on her side.

There was a good deal of shock after the operation, the temperature being 96° F. in the evening, but the patient rallied well and left the hospital September 5, 1903, the wound being healed. She has now very good health, and looks stouter than before the operation. She has had some bother from stitch sinuses in the loin, but the urine soon became and has continued normal.

The composition of the calculus was reported as follows: carbonate and phosphate are present, united with calcium and magnesium. Ammonium salts and uric acid are absent.

CASE IV.—The next patient, who is now, as you see, a stout, healthy-looking man, had an unusually large collection of pus in the kidney, the size of which could not be defined before the operation.

T. J., aged 51 years, a wood-sawyer, was transferred from the care of Dr. Hector Mackenzie in the Florence Ward to the Leopold Ward on March 24, 1903. From notes by Mr. Whitting it appears that with the exception of an attack of rheumatism fourteen years ago, the patient had enjoyed good health. On December 30, 1902, he had slight general pain in the abdomen, but his appetite was good, bowels regular, and he had no vomiting. He saw a doctor, who

kept him in bed for a fortnight. When he got up again, he noticed that his urine was thick, and he passed more than usual, having to get up twice in the night, but there was no pain on micturition. For the next month the patient stayed at home; he had no pain, but his urine was thick.

On February 25 he resumed work, but had to give it up after two days. On March 2 he had pain in the right hypochondrium: it came on gradually, was intermittent, and of a stabbing character.

When admitted under the care of Dr. Mackenzie on March 6, the condition of the abdomen was as follows: "The abdomen moves well. There is fulness in the right flank, and impairment of resonance up to the costal margin. There is also some tenderness. On palpation a well-defined mass can be felt between the last rib and crest of the ilium, which moves in respiration and can be pushed forward from behind. The liver is enlarged, stretching two inches below the costal margin, but it moves independently of the mass in the flank." The urine had a specific gravity of 1020, and contained a trace of albumin and some pus-cells, but no blood.

After this date, until nephrectomy was done on February 24, pus-cells were always present in the urine, but no tubercle bacilli were found. There was slight pain at times and the tumor increased in size. The temperature varied from 101° F. to normal.

The operation of removal of the kidney was a difficult one in this case, for the patient was short and stout, though also muscular, and the space between the last rib and the iliac crest was narrow. An incision two inches in length was made in the right lumbar region, an inch below and parallel with the last rib. On reaching the kidney a trochar and cannula was inserted, and as much pus as possible drawn off; this measured 56 ounces. The renal tumor was exposed and some of the kidney shelled out of its bed; but it was found advisable to excise the organ, and gradually enucleate it after emptying it of more pus. The part under the diaphragm was large, thinned, and very adherent, so that the separation of this by the hand passed through the narrow space in the lumbar region was difficult and cramping. In some places it was necessary to use scissors to divide the adhesions. The pedicle was ligatured with thick silk in two parts, one including the ureter. The kidney measured about 9 inches in length, 5 inches from before backward, and

5 from side to side. In parts the renal tissue was replaced by dense fibrous growth. Seventy-two ounces of pus was collected; more escaped during the operation. In the pelvis of the kidney was a small handful of irregular calculi which weighed 30 grams. They were mostly phosphatic. Some were large and branching. The wound was closed with deep and superficial sutures, excepting posteriorly where a drainage tube was inserted.

The patient left the hospital on May 15, 1903, and has since enjoyed excellent health; he has put on flesh and resumed his employment as a wood-sawyer.

In these four cases a pyonephrosis had resulted as a consequence of the changes produced by the action of "quiet" stones in the pelvis of a kidney. In the following case the first intimation that there was anything amiss with the man was the sudden appearance of a swelling in the loin. From its characters and history this might have been a spinal abscess, but the state of the urine and an absence of rigidity of the spine suggested the true cause. The earlier stones removed did not present a broken surface, and it was only in the later stages that the full amount of calculous formation was ascertained. As the kidney was from the first bound down by inflammatory changes, it was not possible to lift it out and explore fully. When the abscess discharged through the lung, nephrectomy appeared to be the only chance of saving the life of the patient, but the inflammatory mass which fixed it at first had increased in extent and firmness, so that it was set fast as in plaster of Paris. Luckily the remains of the stone were extricated at this operation, and so nephrectomy was not necessary, the patient making a recovery which continues satisfactory.

CASE V.—J. S., a carman, aged 19 years, was admitted into St. Thomas's Hospital on March 19, 1901, with a swelling in the right lumbar region of five weeks' duration. (For the notes of this patient I am indebted to Mr. Gibson.) The patient did not know what first drew his attention to this swelling as it had not been painful, and he did not think it was increasing in size. There had been some complaint of pain around the right side for more than twelve months, coming on about once a week, especially when the patient rested on the Sunday. This pain had shot across the

side, but not into the testis or even in that direction. He had never suffered from backache, and was positive that the swelling came in one night. Directly after the swelling appeared the patient noticed that his water was wrong, being thick after standing, and he also observed that at the end of micturition he passed a lot of "yellow stuff." Two days ago he passed some blood of dark color. He had had night sweats for a fortnight.

In the right lumbar region was a rather prominent swelling, which extended from near the middle line behind outward for about 3 inches. In a vertical direction it extended from above the crest of the ilium to the last rib. It was soft and fluctuating, and with pressure could be made to disappear. There was some tenderness on deep pressure, and a marked impulse on coughing. No swelling was seen or felt in the front, but there was a little tenderness on pressure over the right kidney. No fluctuation could be felt through from the back. The patient was rather thin, but had been at work until recently. He presented no signs of tuberculous deposit anywhere. The urine had a specific gravity of 1012, was alkaline, thick and turbid, and contained pus, triple phosphates, and blood-cells.

On March 27, an incision was made by the House Surgeon, Mr. T. Burfield, and a considerable amount of pus evacuated. There was a track leading in the direction of the kidney and another toward the spine, but no calculus was found. The wound was thoroughly washed out and an attempt made to close it. The pus was described as thick and caseous. The attempt to obtain healing of the abscess cavity did not succeed, and a small amount of discharge commenced, and continued until the operation on April 30. The urine had meanwhile varied very much in character; occasionally there had been no pus or blood in it, but sometimes there had been a marked amount. On that date the wound was extended and explored, a small calculus being removed from the renal pelvis; it was composed of calcium, magnesium, and triple phosphates. The discharge from the wound continued. He had an occasional attack of pain in the renal region, of no great severity; the state of the urine did not much change; and on May 31 the renal portion of the sinus was cleared of some phos-

phatic deposit. No definite stone could be felt. After this the discharge diminished, and the patient improved so much that he was sent to a convalescent home on July 17, 1901.

He was readmitted on February 13, 1902, with a discharging sinus in the right loin. The urine had then a specific gravity of 1030; was acid and contained albumin.

On February 21, four stones were extracted with difficulty from the right kidney. Again, on May 2, some fragments of calculus were removed; these were evidently portions of a branched stone, occupying some of the calyces of the kidney, and led to a prolonged search without further results. After this operation an abscess formed, establishing a communication with the right lung, and when syringing of the wound was carried out, the patient could taste the solution employed. He also had a severe cough with expectoration, but no rise of temperature.

On July 15, an attempt was made to excise the kidney, but everything was so firmly adherent to the surrounding parts that this was unsuccessful; the kidney could not be distinguished from other structures. However, two stones were removed, one lying in an abscess cavity leading into the thorax. The patient expectorated a good deal of blood during this operation. The wound was drained.

This time all fragments apparently had been removed, for, although the wound discharged very offensive pus for some days and the cough and expectoration continued, the urine gradually became normal, the loin wound closed, and the lung symptoms gradually disappeared. He left the hospital for a convalescent home on September 24, 1902, and has continued well.

CASE VI.—In yet another case the patient died from the effects of extensive calculous deposits in both kidneys, which must have been forming for years. The changes produced had proceeded to such an advanced stage in both kidneys that interference with the function of one rendered the other unable to carry on the work. Surgical assistance was too late to save the man. Frequent micturition with pus in acid urine were the only evidences of disease which led to a correct diagnosis, and even this condition of urine could not have been a constant one, for he had been under skilled treatment for three months for cystitis shortly before admission.

A broken-down tramp, aged 42 years, was admitted under my care to the Royal Free Hospital on May 11, 1899, suffering from frequent micturition of some years' duration. His history was not very clear, but he appeared to have been in the South Shields Infirmary two years before, the Greenwich Infirmary, and a London Hospital, for urinary symptoms. He had passed blood on exertion before entering the first of these institutions, but not since. He had been three months under treatment recently for cystitis. As regards pain, he had suffered very little from pain at any time, but was in Greenwich for "tightness" of the left side. When admitted to the Royal Free Hospital, he had acid urine with pus in it to a small extent, but the urine became alkaline and blood was found under the microscope. There was some tenderness of the right kidney.

From the history of frequent micturition extending over a long period of time, with pus in acid urine, calculous pyelitis was suspected, but whether in both sides or one only it was not possible to say. His replies were not very dependable, but he admitted that there had been more aching on the right side than on the left after a long walk; it did not appear that he had done any work for a long time. There was also some tenderness of the right kidney, so it was decided to explore this. Examination by the x-rays gave no assistance.

On May 21, right nephrolithotomy was performed, a large branched calculus being removed in pieces. The kidney was washed out and drained. The amount of urine, which had been 100 ounces a day (specific gravity 1010) before operation, diminished to 30 ounces, and for four days he suffered from frequent vomiting. A normal quantity was then passed for three days. It then decreased in quantity, vomiting returned with delirium, and he died on June 7 after complete anuria for 48 hours. At the necropsy, the right kidney, pelvis, and ureter were much dilated, and filled with pus and detritus. A small calculus was found. The pyramids were a blackish-green, necrotic, and partially destroyed. In one or two places the cortex was breaking down, but there was a considerable amount of renal substance left, and no metastatic abscesses were present. The left kidney was enlarged, weighing twelve ounces; the pelvis and ureter were much dilated,

the latter being the size of a small finger, and the pelvis and calyces were distended with calculi. The renal substance was pale, and showed small, raised, yellowish-white patches on the surface. Some pus oozed from one place on stripping the capsule. The bladder was hypertrophied, and showed evidence of recent cystitis. The other organs were normal.

It has been well known for a long time that renal calculi may remain undetected for many years; the symptoms produced may be overlooked or there may not have been any of importance; at all events no complaint is known to have been made by many patients in whom they are unexpectedly found. The patient I have shown you demonstrates some of the more unusual states that may result locally from calculi. In case of doubt as to which kidney is affected, if the x-rays do not assist by showing a shadow in the expected position, it would be well to examine the urine as it escapes from the ureter by means of the cystoscope, catheterize the ureters, use the separator, or in some cases do an abdominal section and examine both kidneys before deciding on which side to operate.

THE TREATMENT OF CARCINOMA OF THE TONGUE

BY J. L. FAURE, M.D.

Surgeon to the Paris Hospitals

CARCINOMA of the tongue is a terrible disease, and, although it is difficult for us to establish any precise scale in the lamentable group of carcinomatous manifestations, I think that every one agrees in placing this one at the head. In the suffering it causes, and in the despair in which it plunges the unfortunate men afflicted with it, who can each day follow the progress of the disorder, it exceeds in horror and torture all other manifestations of carcinoma.

But this is not all. Carcinoma of the tongue is not only the most cruel form of that disorder, but also the most difficult to cure. Relapse occurs here more certainly and rapidly than in carcinoma of other organs, even carcinoma of the uterus, which is perhaps the most relentless and discouraging form next to carcinoma of the tongue.

Finally, operations undertaken for its removal are serious and are far from having benefited from the general improvement that has transformed the operative prognosis of almost all other interventions.

Does this mean that in presence of such a case we must abandon all hope and renounce the struggle until the advent of better, though remote, days when we shall come into possession of means other than the knife with which to cure carcinoma? Not at all. Although carcinoma of the tongue can be rarely cured permanently, it sometimes is cured, and is often alleviated, which are results sufficiently important to make it our duty to fight it to the end.

Again, the bad results that have been hitherto obtained in the treatment of carcinoma of the tongue need not occasion surprise. Up to recent years the operations performed were of such a nature that no other outcome was to have been expected.

Poirier, in his remarks to the Société de Chirurgie de Paris

on this subject, found courage enough to say this frankly, and our duty is to repeat it: up to the present time operations for carcinoma of the tongue have all been defective. Whatever may have been the courage and talent of our predecessors and masters, the operations they performed in this case were badly regulated and insufficient ones, which, whether as concerned the seat of the disease, or the lymph-nodes involved, were almost always necessarily incomplete. Their instruments were imperfect, and their surgical methods and operative technic were not what they are to-day; so that the point that rightly causes us to wonder is not that carcinoma of the tongue in the hands of our predecessors relapsed in such an inexorable way, but that it was ever cured in any instance at all.

In treating such patients we are placed in special circumstances. In addition to the operative difficulties connected with all major interventions on the neck,—and each operation for carcinoma of the tongue becomes, through searching for lymph-nodes, an operation on the neck,—we have to take into account an element that constitutes a severe aggravation for the prognosis: this is, that at the same time that we are operating on the neck we are obliged to operate in the mouth as well, and in a mouth where a carcinomatous ulcer maintains a constant state of infection and of irredeemable septicity. This explains why this operation has only derived a moderate amount of benefit from modern methods, and why in this instance the operative death-rate is almost as great now as it used to be in the days of septic surgery.

The experience of our masters has been of use to us, and nothing prevents our adding to it on our own score; and it is in this way that we are now in a position, I am convinced, to lay down rules that will enable us to obtain results which, although possibly not brilliant, will at least be less discouraging than those observed heretofore.

It is these rules that I wish to dwell on to-day, refraining from precise details of technic, and laying stress only on their general character, whereby alone they will prove of interest to every one, from the skilful surgeon to the busy general practitioner.

To begin with, in this, as in all forms of carcinoma, possibly more than in all other forms, it is important to operate in an early stage; temporizing, which the timid call prudence, may be

fatal. It deprives the patient of some of the chances of definite recovery that he may have, and that are, as it is, not so very numerous. It does more: by allowing the disorder to progress, it necessitates more extensive and consequently more serious operations. So that on the one hand it does away with a certain portion of the chance for radical cure, and on the other, it increases the chance for operative death. It is a disastrous course of action, which ought to be abandoned once and for all.

Physicians too often lose valuable time in useless watching the patient, and in treatments often directly harmful,—for we know that certain medication, and in particular the specific one (mercury and potassium iodide), merely stimulate the development of the disease. Still, in some cases, one is obliged to give this treatment a trial; but it should be quickly abandoned unless a favorable result is seen in a very brief period. In doubtful cases we have a better means than the specific treatment; removal from the edge of the suspicious ulceration of a tiny fragment will enable us by histologic examination to recognize the precise nature of the disorder.

Consequently, when there is hesitation in the diagnosis, as is not uncommon in the first stage, when the carcinoma is still only a small, indurated ulceration, a histologic examination of a small fragment of the tumor should be made as early as possible; this is the only means whereby we can be rapidly and certainly informed of the nature of the disorder.

As soon as the diagnosis is certain an operation must be performed, and nothing but an extensive one will suffice. But although all surgeons now agree as to the necessity of an extensive operation, they by no means agree as to the best way to accomplish this end. Is it best to operate by the mouth; is it preferable to enter above the hyoid bone; should the maxilla be respected, or should it be remorselessly sacrificed; should we have recourse to preliminary tracheotomy, or endeavor to get along without it; what is the best line of conduct as regards the lymph-nodes,—all of these are points that are freely discussed and open to discussion, and which, furthermore, may have to be dealt with differently according to the special features of each case.

My experience with this operation has been quite extensive;

little by little my ideas have assumed a concise form; and nowadays the way that seems to me best to act in such cases is as follows:

Formerly I used to perform preliminary tracheotomy, though generally in carcinoma of the base of the tongue and of the pharynx. This operation, in which I always followed the inter-crico-hyoid route, and which requires only a few seconds, renders the greatest service during the operation. By its means the anesthesia is facilitated, and all the accidents due to the entrance of blood into the air-passages are avoided. It is an operative precaution of great value, and it enables one to finish by plugging the region in cases of extensive removal of pharyngeal tissue. But, on the other hand, I am convinced that, once the operation ended, it renders the operative prognosis less favorable; the presence of a cannula in the trachea facilitates infection of the air-passages, which are already only too prone to become infected. I am aware that the cannula can be removed at once after the operation, in order to avoid these unfortunate sequels.

I should have nowadays much less hesitation in performing preliminary tracheotomy, provided the cannula were removed as soon as the operation was over. But since in the majority of cases the operation can be successfully carried through without tracheotomy, I still prefer to get along without it. Nevertheless I always have on hand a cannula, ready to be inserted into the inter-crico-hyoid space at any moment that the respiratory symptoms become either serious or even troublesome. This seems to me the wisest plan: not to perform preliminary tracheotomy as a matter of routine, but to do so during the course of the operation if respiratory accidents arise; in that case, to remove the cannula at the close of the operation to avoid, so far as possible, the danger of pulmonary infection.

Poirier has on a number of occasions insisted on the absolute necessity of removing in all cases of carcinoma of the tongue the submaxillary and carotid lymph-nodes, as well as those strung out along the vessels, and this on both sides of the neck. He thinks that anastomosis is sufficiently free between the two lymphatic zones of the two sides of the tongue, to enable neoplastic infection to reach all the lymph-nodes of the neck in every case of carcinoma of that organ, both on the healthy and on the diseased side.

In a general way no objection can be made to this radical precept, and it is self-evident that the more lymph-nodes are removed the safer you are. But truth compels me to remark that having personally never yet found, in cases of carcinoma limited to one side of the tongue, lymph-node disease or relapse on the opposite side, I am inclined to consider Poirier's rule as a little too absolute; and I question whether the advantage there may be, and that on general principles there certainly is, in removing the gland-tracts of both sides of the neck, is not more than offset by the drawbacks arising from so extensive an operation, particularly since when the lymph-nodes of the opposite side are affected, the chance there is of removing them in their entirety is in reality very slight.

In a word,—without wishing to oppose Poirier's suggestion in any way, to which in the main I see no objection to make, and until such a time as I shall have met with a case of relapse on the other side of the neck, I shall be satisfied with removing the lymph-nodes on the side of the disease, being careful to make every endeavor to remove those about the carotid, which, especially when the carcinoma is situated fairly back on the tongue, are generally implicated and very difficult to remove.

In every operation of this sort, therefore, it is imperative to remove the disorder amply, together with the submaxillary, carotid and sternomastoid gland-zones on the same side, at least. But in what manner is this to be accomplished? This is where we are authorized to hesitate, and where it is really difficult to lay down any single rule of conduct.

In operating for carcinoma in general there is a rule that, so far as may be possible, it is best to remove in a single mass the tumor, the lymph-nodes corresponding to it, and the lymphatic ducts connecting the tumor with these lymph-nodes. Unfortunately the only region in which this method of action is applicable satisfactorily is in carcinoma of the breast; and this is no doubt why we are able to obtain such good results in this form of the disease, in which, when the operation is properly performed, I am convinced that fully one-third of the patients are definitely cured. But for the tongue the anatomic arrangement of the organs makes such a course impracticable. It is of course possible, and even easy, to remove in a single mass any portion of the tongue, or the entire

tongue, together with the floor of the mouth and the entire sub-maxillary and carotid region, with a portion of the maxilla itself, by passing through the supra-hyoid region. Unfortunately this way of proceeding is not without drawbacks, and an operation carried out in this way is a frightfully serious one. In the mouth we can perform by themselves very extensive operations without any great harm to the patients. In the neck we can likewise perform enormous operations, which prove very harmless in spite of their extent. But as soon as we connect an operation in the mouth with one on the neck, the operative prognosis is altered entirely; such an operation is a very serious affair, the cellular tissues of the neck, infected by the secretions of the mouth, suppurate, wholesale toxic absorption takes place in this cellular tissue, and a large number of such patients succumb in the first three or four days from infection, septicemia and bronchopneumonia, which the most constant and energetic disinfection is powerless to avert.

I may add that the removal of a portion of the maxilla, an indispensable step when it is diseased, has always seemed to me to make the prognosis darker still, and I think it best, whenever possible, not to touch this bone in any manner. This is practically unfeasible in carcinoma of the tonsil and pharynx; but in carcinoma of the tongue nothing is easier, and a healthy maxilla should not be disturbed.

In view of the peculiarly serious features of which I have just spoken, we have reason to hesitate before removing such a tumor in a single mass and creating such a fearful loss of tissue. The chances of a definite recovery are not much increased thereby, whereas the probability of operative death is enormously increased. There are, of course, cases in which no other method is possible; when, for instance, the floor of the mouth together with the sub-maxillary and carotid regions are thoroughly infiltrated with carcinoma and form a single mass, one must either do nothing, or trust to chance and remove the tongue, floor of the mouth, carotid region, and even the maxilla, if diseased,—an operation not at all difficult, in spite of appearances.

Many such patients will then die, but a few may recover and derive great benefit from the operation; some may even be entirely

cured, and this is sufficient to warrant our following this course in trying to relieve these sufferers from their appalling situation.

But fortunately things have not always advanced to such a stage as this, and such cases will become fewer and fewer as physicians learn to show greater confidence in surgery and send us their patients in the earlier stages of the disorder. And then, when we are in presence of a man with a carcinomatous ulceration of the tongue, and, as is the ordinary rule, of the middle portion of its edge, I think that our line of action should be quite different from the above.

It was Poirier, whose courage and tenacity I admire in this struggle against the most disheartening of all ills, who, during a conversation in which I referred to my ideas on the subject and my hope for ultimate success, said for the first time, to my knowledge, that, in order to avoid the frightful death-rate of operations on the tongue and neck, such operations ought to be carried out in two stages.

Curiously enough, subsequently to this conversation Poirier and I had occasion to see Butlin, of London, operate in this fashion. The personal experience of this surgeon in carcinoma of the tongue has been considerable and has led him to the same conclusion as that of Poirier,—which goes to show, that two strong and perceptive minds can, quite separately, arrive at a similar truth.

For there can be no possible doubt that the truth of the question lies in that direction, and I feel quite sure that future experience will not belie me. Whenever, in carcinoma of the tongue, the floor of the mouth is not involved, and such an operation is physically possible, it should be done in two stages. The drawback that thereby one leaves intact a few lymphatic vessels, which may, or may not, contain some carcinomatous elements and possibly expose the patient to relapse, is a matter of infinitely less consequence than the great danger of death that the patient incurs when the tumor, floor of the mouth, and lymph-nodes are all removed together at a single sitting.

An operation of this sort should, then, be carried out somewhat as follows: The tumor should first be removed, localized at the point, on the side, or even at the base of the tongue near the anterior arch of the soft palate; this is not difficult to do. After cutting through this arch and the *genio-glossi* muscles, the tongue can be

drawn very far forward and can, by means of scissors, be removed almost at its root. Anyhow, if necessary, the cheek can be cut through from the corner of the mouth to the ascending branch of the lower maxilla,—although in the majority of cases this is not necessary. Only when the tumor is situated at the base of the tongue, completely behind toward the epiglottis, is extirpation by the mouth impossible; for the anterior three-fourths, it is quite possible. With a few snips with the scissors, then, the tongue should be removed, and the floor of the mouth respected. The wound of the tongue should be sutured, and in a few days recovery will be complete. When the patient is quite restored, in twelve to fifteen days on an average, the complimentary operation should be performed on the neck by dissecting out the lymph-node zones, without communicating with the region operated on in the mouth, and under conditions of asepsis that render the operation almost harmless.

I am convinced that by following this plan we shall see the operative mortality in this disorder descend to a very considerable degree, while at the same time we shall obtain more definite cures than formerly, because each of the two operations will thus be done more completely and more carefully than in the past. The disadvantage of subjecting the patient to two operations is insignificant compared with the evident advantages necessarily derived from this line of conduct, and no one would ever have the idea of contesting that it is better to cure a patient by putting him through two operations than to kill him under pretext of sparing him one of them.

Again, if an intrabuccal operation seems likely to be rapid and easy, in the case of a small tumor in the early stage, for instance, I think that it might be quite possible to do both operations in a single sitting. But in that case the one on the neck had better be done first, in order to get the advantage of more perfect aseptic conditions; the one in the mouth being done last, and the floor of the mouth being carefully respected.

THE IMPORTANCE OF A STUDY OF THE PULSE IN SURGICAL DISORDERS, WITH SPECIAL REFER- ENCE TO ITS BEARING ON DIAGNOSIS, PROGNOSIS, AND TREATMENT

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THE important part played by the study of the pulse up to the commencement of the last century is well known, and it may be said that with the ancients the sphygmie art was one of the principal branches of medicine. Deprived of other means of investigation, which at the present time we possess, they based almost their entire clinical studies on the changes of the pulse alone. The rigorous care that they employed to analyze the most trifling characters, the infinite number of conditions that they recognized in it, shows the exaggerated importance that they gave to it, and for this reason one must not be astonished at the conclusions, quite as false as fantastic, that they drew. But if the errors into which ancient medicine fell are explained, time has justified this, and all this labor as well, and at the present the débris alone remains. Nevertheless, the ancients were great observers, and if, led astray by their theories, they were deceived by the signification of the pulse, all in their doctrine is perhaps not to be rejected, and many points still certainly merit careful consideration. If, at the present time, this functional sign has lost the greater part of its prestige, if it has lost much of its ancient splendor, the place that it still occupies in general pathology is nevertheless extremely important.

The physician consults the pulse in fever each time that he is desirous of ascertaining the condition of the heart, the peripheral circulation, the general condition of the patient, notions which are for him essential. This applies also to the surgeon, because the same

knowledge is quite as indispensable to him, and no less than the physician could he do without consulting the pulse. Not only must he examine the local symptoms of an affection, but the manner in which the disease reacts on the entire organism as well. It is upon this condition that he is able to make a good prognosis, direct and carry out his interference.

The importance of functional symptoms is consequently capital in surgery, and, among them, the characters of the radial pulse call for a well-merited place. In point of fact, the pulse is one of the rare phenomena by which the circulation is revealed to our senses, and one of the rare means which we have at our disposal to appreciate the manner in which it is being accomplished. Now, we know that this function, one of the most important of the body, is subject to all the influences that disturb the organism. Many diseases, whether belonging to internal or external pathology, cause changes to arise in the pulse, the expression of which is perhaps the most exact measure of the vital force of the patient. If to this notion of the highest importance we add that, in many cases, the arterial pulsation also furnishes the surgeon with more special and precise indications, as we shall show later, we must also admit that in surgery the indications revealed by the pulse are far from being vain or sterile. Special importance is to be attached to the frequency, rhythm, and strength of the pulse.

In the normal adult the pulse varies between 60 and 80 beats a minute. The pulse is said to be frequent when the beats reach from 90 to 120 per minute; on the contrary, the pulse is called slow when the beats are below 60 or 50. We will point out that the frequency of the pulsations is one of the principal symptoms of fever, but that in the normal condition many circumstances may cause an increase. For this reason, many peculiarities must be known, so that certain normal characters of the pulse may not be considered pathologic. In children, for example, the beats oscillate between 90 and 100, and in women the pulse is always more rapid than in men. The constitution, muscular exercise, the external temperature, or the ingestion of food, causes variations in the frequency. We should, above all, recall the influence of moral emotions,—which increase the rate; this acceleration may be mistaken by the surgeon for a morbid change. Thus, from the mental disturbance which the arrival of the surgeon causes,

the heart-beats increase,—whence it is always well to examine the pulse again at the end of the visit in order to ascertain whether the acceleration found at the beginning has diminished, so that one may assure himself whether it is really due to the disease or to fear on the patient's part. The frequency of the pulse consequently may vary accidentally in a normal condition, and its appreciation requires the greatest prudence on the part of the surgeon. The individual varieties themselves are very great in this respect, and in a patient whose pulse is from 40 to 50 per minute normally, pulsations of from 80 to 100 indicate a considerable frequency, whereas such a rate would be quite moderate for a subject having from 80 to 90 beats in a normal condition. Unfortunately, however, these peculiarities cannot be taken into consideration, unless one has already known the patient.

The form of the beats varies according to their strength. The pulse is strong or weak, and this character can be appreciated by the finger from the intensity of the sensation experienced while palpating the artery, but it can be better judged of by the use of the sphygmograph by the height attained by the pulsation curve. This amplitude of the pulse depends upon the strength of the ventricular contraction and of the arterial tension; further on I shall point out the causes which modify the amplitude in surgical diseases, although at present I would say that in the majority of cases smallness of the pulse indicates a more or less marked depression of the vital strength, especially when the pulse is frequent. I should also say a word on the dicrotic pulse,—which gives the sensation of a second pulsation. This character is to be found in the tracings of the normal pulse, while hemorrhage and septic infection increase the dicrotism.

The rhythm of the pulse should be studied with reference to the equality that the pulsations present in their amplitude and to the duration of the interval separating each beat. The pulse is unequal when the beats differ from one another; it is irregular when the beats are neither equal nor regular in their unequalness. The pulse is said to be intermittent when one or several beats appear to be wanting and when the interval that separates them does not present the normal regularity.

For many years the frequency of the pulse was employed for

measuring the intensity of fever, but, at the present time, it is no longer the same, and Boerhaave's aphorism, "*Quidquid de febre novit medicus, id vero omne velocitate pulsuum sola cognoscitur,*" has lost its value. The pathologic physiology of fever is now known, and the progress realized in physics and chemistry has proved that its only constant character resides in the increase of heat. The use of the thermometer has allowed one to appreciate this constant rise of temperature, and has put observers on the right road. Since then the thermometric indications have been, and rightly, the true guide of the physician and surgeon in febrile affections, and the diagnostic value of the pulse has become more restricted. The fact has become recognized that its acceleration, although one of the symptoms of fever, can be due to other causes, and its variability has consequently prevented its being judged an exact measure of the febrile condition,—of which the increased temperature is the most precise expression.

But the near relationship that exists between the pulse and the temperature persists for all that. The heat of fever gives to the circulation a special and constant modality,—namely, a decrease in the arterial tension and blood-pressure, which produce the increase of the beats. A temperature of 38.8° C. (102° F.) corresponds to 100 beats, 39.4° (103° F.) to 110, and 40° (104° F.) to 120 beats. Frequently, with the temperature relatively low, or even normal, the pulse may beat 120 or 130 times per minute,—which discord may occasionally give extremely useful indications from the standpoint of a diagnosis of the various febrile conditions, and especially the prognosis. Thus, in many cases, the knowledge of the degree of temperature is not sufficient for the surgeon, and he should compare it with the changes in the pulse, whereby the signification of the febrile condition becomes greatly enhanced.

In many cases, the temperature-curve, and the group of general symptoms which accompany infection of the organism, are sufficient to put the surgeon on his guard and warn him of the danger which threatens the patient. But he can also frequently find in the various changes that infectious diseases produce in the pulse certain data of great value. When in a subject who has been wounded, or who has undergone an operation, fever makes its presence known by a rise in temperature of one, two, or even three degrees, and the pulse is rapid but full and well struck, presenting, in

other words, all the characters of the inflammatory pulse of the older writers, the condition need not be regarded as serious, because one is generally dealing with traumatic fever. The temperature may even go still higher without making the prognosis more serious, —provided that the pulse retains these same characters and if it follows the oscillations of the temperature.

The same thing cannot be said if the pulse, which should be carefully watched, increases in frequency, becomes so rapid that it cannot be counted, and if the pulsations present irregular intervals. When these occur they indicate a general infection, in the majority of cases, and the traumatic fever then becomes septic. The condition of the patient is far from satisfactory, and a profound general depression will be noted, while the local appearance of the wound becomes changed. However, the temperature may be only slightly raised and may hardly reach 102° or 103° F., while the pulse reaches 140 to 150. One should never be guided by the temperature alone in an endeavor to form a conception of the severity of the fever. As an example of this the following case is instructive: A young man presented a phlegmon of the right forearm, which had occurred without any appreciable cause. After the lapse of a few days a similar collection of pus developed on the other arm, and upon both being opened very little pus was found. The patient's temperature varied between 102° and 103° F., but the pulse ranged from 150 to 160 during the first two or three days, and then increased in frequency as the general symptoms became more serious. In spite of every measure taken the patient died

In cases of sepsis which will end fatally the pulse becomes small, rapid, and irregular, and will be in disaccord with the temperature curve; one should always bear in mind that an extreme acceleration of the pulse with a lowering of the temperature points to the greatest danger. In septicemia the temperature and pulse in the beginning follow each other, and then suddenly the pulse increases, while the temperature falls. In pyemia the pulse follows the rise and the sudden falls of the temperature. The latter reaches 104° to 105° F. after the chill, while the pulse ranges from 120 to 140. Then everything appears normal; when the temperature falls the pulse drops to normal and remains there until the next chill occurs.

In tetanus the pulse increases during the spasms and contractions, reaching from 120 to 140, while in some rare instances it may attain 180. In this infection it is important to compare the pulse and the temperature, and, although the latter may not be raised, the acceleration of the pulse is always present, varying between 100 and 130; and its frequency is an excellent sign of the gravity of the case.

In surgery, as in medicine, a severe hemorrhage is accompanied by a group of general phenomena, among which the changes in the character of the pulse are to be especially noted. When the flow of blood remains confined in some organ or for some reason does not make its exit externally, these symptoms acquire a capital importance for the surgeon, and alone can put him on the track of the true cause of the symptoms observed. Consequently too much care cannot be given to the study of the pulse, in order that we may promptly relieve the patient, who otherwise may die.

Among the general symptoms there is paleness of the face, skin, and mucous membranes, lowering of the temperature, etc., all of which are without doubt excellent symptoms pointing to hemorrhage. They occur, however, late in the process; and they may be due to other conditions, so that a false interpretation may frequently be given them; while, if the changes in the pulse are carefully studied, all doubt may be done away with, since they furnish the most precise and early symptomatic indications.

The circulation, directly interested by the exit from a vessel of a greater or less amount of blood, naturally presents immediate changes, which can be estimated by the pulse. The characters of the pulse following a hemorrhage will be found in changes in frequency, rhythm, and form. These having been studied by many physiologists and physicians, may be briefly recapitulated.

Nearly all experimenters have noted frequency of the pulse as an effect of loss of blood, which, according to Arloing's experiments, occurs as follows: (1) The pulse increases in frequency as long as the decrease of pressure does not reach beyond one-third of the normal pressure; (2) the pulse returns to nearly the normal frequency while the pressure is between the third or the fifth of the normal pressure; and (3) the pulse again increases in frequency when the pressure falls below the fifth to reach zero.

In practice, in a patient whose life is compromised by hemorrhage, the pulse is rapid, although one should not forget that a period may be met with in which the pulse will be found relatively slow. From the fact of the hemorrhage the amplitude of the pulse diminishes, because it has been shown experimentally that the strength of the pulse diminishes if the heart-beats increase, and that it will increase when the latter become less. Now, as we have shown, there is an increase of the pulse-beats following a large loss of blood, and they should also be small and weak. The same condition is observed clinically when, following serious hemorrhages, the pulse little by little loses its strength and resistance, and at the same time increases in frequency as the loss of blood becomes greater. At a more advanced period it becomes irregular and intermittent, showing the serious disturbances produced in the ventricular contractions, and as a prelude to approaching death.

The great weakness and acceleration of the pulse have a still greater value in the diagnosis of secondary hemorrhage following abdominal operations. These internal hemorrhages, like those due to typhoid fever, ulcer or carcinoma of the stomach, etc., only show in the beginning a group of general symptoms, of which the most characteristic is a great depression of the pulse. It, however, must be admitted that a sudden fall of temperature is also frequent, or even constant, and for this reason is a very precious sign. But when one realizes how fearful may be the hemorrhage from an ill-secured pedicle, resulting from the removal of the tube, ovary, spleen, and so forth, a single means of investigation is not sufficient, because one must be immediately put on the track of the true cause of the accident in order that he may interfere immediately.

Serious accidents, either on account of the extent of the disorders, or the organs which have been involved, major operations, extensive burns, etc., bring about certain perturbations in the organism whose ensemble constitutes what is known as surgical shock. These symptoms are characterized by torpor, general lassitude, and a most striking aspect: the face is pale and drawn, the skin covered with cold sweat; the patient lies without moving, giving vent to plaintive cries; without replying to questions and without resistance he allows the most painful examinations to be made, all sensation

appearing to be abolished. Everything points to a general depression with a more or less marked arrest of all functions.

In the presence of such an alarming condition the surgeon endeavors to establish a prognosis and to estimate the degree of vital resistance of the patient. The gravity of the wounds, the more or less accentuated phenomena that have already been rapidly mentioned will certainly serve, but it is without doubt of more importance to examine carefully the condition of the heart and the circulation in order to have an exact idea of the patient's strength.

In point of fact, shock is a phenomenon produced by a reflex paralysis of peripheral origin, involving all organs, and the heart more particularly. It may be defined as a sudden attack upon the circulation, following a traumatism, developing through the intermediation of the nervous system, and rapidly producing death, or prolonged prostration followed by a reaction, the issue of which is more or less fortunate. The entire group of symptoms point to a disturbance and want of energy of the circulation. For this reason the pulse gives valuable indications; its changes interpret faithfully the condition, and are, for this reason, the best signs upon which to base the prognosis.

When a patient presents the symptoms of shock the surgeon should carefully examine the pulse, noting its frequency, irregularity, and weakness. It will be found weak and irregular, because the functions of the heart and the vessels are profoundly disturbed; there is a hindrance to its impulse and resistance on the part of the capillaries on account of reflex paralysis. Its increased frequency is due to a diminution of the arterial tension, and, if a sphygmographic picture is obtained, it will show a short ascension, with a very marked plateau.

Such are the three principal characters of the pulse, but they may show various degrees, which indicate correctly the vital force of the patient. A weak pulse on the point of becoming imperceptible is the indication of a very serious condition, and the prognosis should be reserved, although the traumatism may appear to be of only medium gravity. A marked irregularity, an excessive frequency, which makes the pulse difficult to count, are also met with when the condition is alarming.

On the other hand, if, in the midst of other symptoms, which at first sight might give rise to serious fears, the pulse has retained sufficient strength and presents more or less moderation in the frequency and irregularity of the beats, there is some reason to hope for a fortunate outcome. In point of fact, it proves that the heart is not too weak and that there still remains sufficient life in the patient to enable him to face the dangers and continue the fight for life. Consequently, the changes in the condition of the pulse which occur almost from minute to minute should be noted, and, as has been said they are one of the best signs upon which to base a sure and exact prognosis.

The pulse does not always present the characters of frequency, smallness, and irregularity; sometimes it is practically imperceptible the heart-beats are very slow and can no longer be detected. Here one is dealing with syncope, which must be distinguished from traumatic shock. In shock the respirations are slow, irregular, and sighing, or, on the other hand, they may be intermittent and deep; or, again, quite imperceptible. The pulse is small, weak, irregular, and frequent; the patient has a vague and imperfect consciousness. In syncope the respiration no longer exists, the pulse cannot be found, while the heart may have ceased in its functions and the patient is unconscious.

In order to be guided as to the advisability of an operation upon a subject having undergone a severe traumatism the condition of the pulse should be taken into very serious consideration, as it is the most exact expression of the patient's vital resistance. When there is a question of an amputation, or of some other serious operation, it must be decided whether it is to be done at once or postponed. One should decide whether the subject has sufficient strength to undergo the shock of an operation and whether or not the intervention will be useless or the best thing for him. The problem is certainly delicate and full of consequences, and in order to solve it the surgeon cannot take too many precautions. For this reason he should consult the pulse, changes in which will give him the indications of the proper thing to do. With a weak, filiform, and almost imperceptible pulse nothing should be done at the time, for it is proof that the organism is seriously involved, and that any intervention would remove what remaining strength there is—with a disastrous result.

In many cases one might be tempted to act because the traumatism itself does not seem very serious, but it is well known that death may occur rapidly from shock, although the lesions themselves may not appear mortal. Should one decide to operate under these conditions without taking into consideration the indications given by the pulse, and should an unfortunate outcome happen, the operator is usually accused of the disaster. Before operating one should wait until the pulse becomes stronger and the patient's strength returns. The pulse increases in fulness and is the first indication of the reaction which is about to occur, and announces the disappearance of the other symptoms. Guthrie's opinion is still valid and is certainly wise,—namely, to wait for from two to six hours, until the pulse commences to regain its strength and the patient has recovered sufficiently to be conscious of pain. Major operations may also produce shock, but this condition is at the present time rarely observed, since general anesthesia has been introduced in surgical practice and the reflex phenomena of pain and fright are so little felt.

One of the principal mistakes which the study of the pulse gave rise to in former times was that each organ affected was believed to have certain conditions of the pulse corresponding to it, and their special characters were the index of the given affection. However, it must be said that lesions of the brain give special changes to the circulation, producing conditions of the pulse which are absolutely characteristic of these affections. For this reason the name of cerebral pulse has been given to the pulse symptomatic of brain lesions. In all cranio-cerebral traumatisms, no matter what lesions may be present, the pulse presents a phenomenon which is absolutely remarkable,—namely, its extreme slowness. Immediately after a cerebral traumatism the pulse will drop to 50, 40, or even 20 beats to the minute; consequently, among all the general symptoms of commotion which accompany lesions of the brain, this sign has always been given the highest value in diagnosis and in prognosis.

The general symptoms that accompany cerebral commotion, traumatic shock, syncope, and hemorrhage, aside from a few peculiarities, are so similar that it is hardly possible to differentiate them. In all of them one meets with the same abolition of the intellectual functions, muscular relaxation, and paleness of the integument. The diagnosis between these different conditions and cerebral commotion

may consequently often offer considerable difficulty, especially if the circumstances of the accident are unknown and if the patient presents no marks of a traumatism. It is just in these cases that the pulse may put the surgeon on the track of the true cause and will indicate whether this general depression is the result of traumatic shock or of cerebral commotion.

When the case is one of shock, syncope, or hemorrhage, the beats are frequent, small, and irregular, and these characters differ greatly from the cerebral pulse, which is slow, well struck, and, so to speak, *solemn*. It is, however, important to make a differential diagnosis of these conditions, but there is a circumstance which presents far greater interest, because the therapeutic indications differ totally. A hemorrhage may coincide with cerebral commotion, and one may rightly ask whether the symptoms observed are due to one or the other of these conditions.

Here again one should resort to the pulse in order to come to some conclusion. If a patient has at the same time cerebral traumatism and hemorrhage, it is very difficult to distinguish the symptoms belonging to the cerebral lesion from those due to the hemorrhage; nevertheless, the distinction is most important, because it is to be taken seriously into consideration in deciding the indications for treatment. The slowness of the pulse, which characterizes commotion, should be particularly noted, as well as the complete abolition of intellectual functions and the muscular relaxation, which are never so extreme after hemorrhage.

Here, consequently, is a most valuable symptom obtained by the characters of the pulse in the diagnosis of cerebral commotion. This, however, is not its only interesting feature, because it can also furnish indications relative to the degree of the commotion, and can aid one to distinguish it from contusion or compression of the brain or intracranial collections of blood. We would, however, say that all these lesions are accompanied by the same slow pulse in the large majority of cases, but it may characterize them if one can ascertain the time that it appeared after the accident, its degree, and duration.

If the pulse becomes slow immediately after a traumatism and soon afterward recovers its frequency, one is dealing with a very slight degree of commotion. In cases in which the pulse remains slow, along with other symptoms, such as stertorous respiration, and

so forth, one is in the presence of a contusion or cerebral compression. As soon as the brain is compressed the pulse becomes slow, and the decrease in the frequency of beats is in direct relation to the amount of pressure present. Nevertheless, when the pressure has notably gone beyond the arterial tension, experimentally one will find that the pulse has become extremely small and practically cannot be counted. Intracranial collections of blood also produce a slow pulse, but one should note that when the collection is due to lesions of the sinuses the beats become extremely frequent. One may also have a slow pulse and the temperature goes up; this occurs when there is a limited purulent collection compressing the brain; but when the meningo-encephalitis becomes diffused, the pulse becomes accelerated at the same time that the temperature goes up.

Meningo-encephalitis, when diffused, is a very serious complication which follows contusions, wounds of the brain, and fractures of the skull. The invasion of the disease is made evident by convulsions and agitation of the patient, coming on anywhere between the third and fifteenth day after the receipt of the injury. The commencement may sometimes pass by unnoticed were it not for two symptoms which are of the greatest value,—namely, a rise in temperature and a rapid pulse. The frequency of the pulse is one of the most important diagnostic elements in this form of inflammation of the meninges and the brain, because it presents a most striking contrast with the ordinary slow cerebral pulse.

A slow, regular and well-struck beat is, as I have already pointed out, the important symptom of commotion, contusion, or compression of the brain, but it should also indicate that there is no fear whatsoever of any diffuse inflammatory complication occurring. Now, when, on the contrary, this is to occur, the beats lose these characters and become hard and very frequent, and should warn the surgeon of the danger, because neither the convulsions, paralysis, nor contractions belong alone to diffuse meningo-encephalitis. We have consequently a true characteristic symptom of these inflammatory phenomena, and this sign, taken from the study of the pulse, still more increases the importance that it presents in other traumatic lesions of the brain.

The slowness of the pulse may be met with a long time after the other primary symptoms of cerebral traumatism have disappeared;

I refer to the permanent slow pulse, so well studied by Charcot. In the greater number of subjects having a pulse-beat of from 40 to 50 a minute, a former cerebral traumatism is noted, sometimes dating back months or years, from which the patient had completely recovered. It is in the pathologic residue of the traumatism that the origin of this condition of the pulse is to be looked for. Charcot believed that this phenomenon is due to a lesion of the upper part of the cervical cord and bulb, and experimental physiology has upheld this view.

In traumatisms and inflammatory affections of the abdomen one always meets a small, frequent, and irregular pulse, and, although these characters are not pathognomonic of lesions of the abdomen, they are nevertheless always present,—whence the term peritoneal pulse. The weak, irregular, and frequent beats are in direct opposition to the cerebral pulse, which is slow, strong, and regular. Consequently, the study of the pulse presents much interest in determining the nature of these intraabdominal affections, as well as their diagnosis, prognosis, and indications for operative interference.

The characters of the pulse in cases of abdominal traumatism furnish us with the same indications as after other major injuries. However, contusions and wounds of the abdomen are accompanied by more accentuated general symptoms. The stupor of the patient is greater, the depression of his strength much more considerable, while the syncope is much more profound. Cases of sudden death are probably more frequent following peritoneal shock, although no other cause can be given for this fatal ending than nervous exhaustion involving all the organic functions. The slow or even complete cessation of the heart-beats, and consequently of the pulse that may arise after major traumatisms, are more particularly observed following blows on the epigastrium, the lower abdomen, and the scrotum, and in penetrating abdominal wounds. Frequently, after having entirely disappeared, the pulse-beats return quite quickly, and the patient regains consciousness. But the accident may also be rapidly fatal. It is well known experimentally that, by repeated blows on the abdomen of the frog, cessation of the heart-beats in diastole will occur; when the heart begins to beat again there is a very marked slowing. The cause of this is a momentary paralysis of the vessels following the shock received by the intestine, the latter being

very hyperemic. There is a fact observed in castration which also should be mentioned: when during this operation the cord is cut, a marked and very appreciable slowing of the pulse takes place, even when the patient is fully under the influence of an anesthetic.

In those cases in which the violence of the shock has not been sufficiently great to cause visceral lesion or death by disturbances of the nervous system, the general symptoms disappear little by little. The suffering and the anxiety of the patient soon give way to quiet; his consciousness returns, the respiration becomes regular, the circulation regains its usual strength, and the pulse becomes strong and more regular. The condition of general exhaustion lasts a variable length of time, and when it ceases it usually indicates, in a large majority of cases, that danger is no longer to be feared. But conditions are not always thus; sometimes the symptoms of shock do not entirely disappear, the abdomen becomes tender and distended, the patient vomits, his expression becomes changed, the pulse small, bounding, and irregular, varying from 100 to 120 per minute, all of which indicate that a peritonitis is developing, whether or not there is any visceral lesion.

This small, bounding, and frequent pulse, coinciding with a rise of temperature, is one of the most important symptoms of the commencement of a peritonitis. If the process remains localized the pulse retains its characters, and a frequency and irregularity of moderate amount suggest a good prognosis. A pulse of 135 to 140 is not always a bad indication; but, on the other hand, if, during its tenseness and resistance, it becomes smaller and more irregular, varying from 145 to 150, it is, with the increase of the other symptoms, one of the proofs that the peritonitis is becoming generalized, and that the patient's situation is perilous.

When a fatal outcome is approaching, the depression of the pulse becomes still more marked; hardly to be counted, it is with difficulty detected by the finger, and it announces the early arrival of death. Lowering of the temperature, complete consciousness, and a feeling of well-being on the patient's part often give to the inexperienced the illusion that the patient will recover; but, properly interpreted, these symptoms are to be looked upon as precursory to death when they are contrasted with the filiform pulse, which cannot be counted.

Ordinarily, in peritonitis, the pulse and the temperature-curve

follow each other, and a temperature of 40° C. (104° F.) corresponds, for example, to 120 beats. Sometimes the pulse reaches 150 per minute, while the temperature remains normal, or is only very slightly raised, and this disproportion makes the prognosis extremely dark. For this reason the temperature gives no indication as to the gravity of a peritonitis, unless it is carefully compared to the pulse-rate, in which case the combination forms the most important indication.

The indications that the study of the pulse furnishes relative to the progress of a peritonitis also serve to guide the surgeon in his treatment of this disease. It is not my intention to consider here those cases in which laparotomy with drainage is indicated, but there are others in which the surgeon may well hesitate to intervene. This is especially so when the general condition is extremely serious and the temperature very high; in these cases the characters of the pulse are of the first importance. If, in spite of this alarming condition, with a pulse of, say 140, but which nevertheless has sufficient strength and is not too irregular, operation is indicated, because the patient will have sufficient resistance to undergo the operation on account of the energy of his circulation and the functions of the heart. Now, with a pulse which is intermittent and difficult to count, the vital force of the patient is extremely low, and the fatal outcome would only be hastened by an operation.

After laparotomy has been performed the pulse is of more importance than the temperature. All operations within the abdomen are nothing more or less than traumatisms, and they are subject to the same complications,—among which peritonitis is to be the most feared. It does not take on the same frank characters that it usually shows, and the symptoms accompanying it are usually far less evident, so that it is often quite a difficult matter to detect them.

Postoperative peritonitis usually commences on the third or fourth day following the operation (although I have seen cases in which it commenced much later) by general lassitude, rise in temperature, and abdominal distension, but there is no marked pain nor vomiting, and anxiety on the part of the patient is very much less than one would be inclined to believe. With these slightly marked symptoms one may often hesitate; but I believe that these phenomena, combined with great depression, increased frequency, and

irregularity of the pulse, will easily confirm the presence of peritoneal infection. For this reason it is necessary to keep in touch with the condition of the pulse, the characters of which soon give indications of an inflammatory complication within the peritoneum. I would, however, point out that a very rapid pulse, developing shortly after an operation, is not always symptomatic of peritonitis, but in this event it falls rapidly to normal, that is, within 24 or 48 hours. In these cases the after events present no irregularity, and a cure is effected in the ordinary time. A rapid pulse alone, therefore, is not a presumptive symptom of peritonitis, and when occurring immediately after the operation is, as I have said, due simply to peritoneal shock.

Changes in the character of the pulse should attract the attention of the operator. If, for example, having noted that the pulse, after an operation, is a little rapid, well struck, and regular, and if on following days it suddenly becomes small, irregular, and rapid, one should fear the development of a complication which may compromise the success of the operation, or at least retard convalescence.

A pulse similar to the peritoneal pulse is met with in intestinal occlusion and strangulated hernia,—small, frequent, and bounding. As in peritonitis, the degree of weakness and frequency indicates the progress of the accidents, and commands an immediate operation. If the pulse becomes imperceptible, operation should be immediately carried out, because a filliform pulse is the index of a fatal outcome, although the patient may appear in excellent condition generally.

In urinary intoxication the pulse is weak and irregular and presents extraordinary intermittance. In acute urinary poisoning the fever and other evident symptoms show themselves, but in the chronic forms this is not the case, and the temperature is somewhat below normal; only rarely above. One can only be guided by the general condition of weakness of the patient, digestive disturbances, changes in the pulse, and the *bruit de galop*. Consequently, in cases of enlarged prostate, old stricture, or calculus, the pulse should be carefully watched, in order to avoid accidents accruing from urinary intoxication.

In surgical affections of the limbs the pulse is of the highest importance, because it furnishes special indications relative to the condition of the local circulation of the wounded limb,—the presence or

absence of the pulse showing the presence or absence of blood-supply. In the same way the strength or weakness of the pulse in the limb gives indications as to the integrity or disturbance of this function. It is hardly necessary to insist upon the gravity following suppression of the arterial circulation, and it is well known that if this exists, one should be warned at an early date, in order, by a prompt operation, to do away with any serious condition.

Many symptoms will show that an artery is injured or compressed, that the circulation is hindered or interrupted, but these symptoms are frequently late in appearing; consequently, the pulsation at the lower extremity of the limb should always be examined when the traumatism is seated high up, since changes in it will be detected before the appearance of other symptoms. In wounds produced by pointed or cutting objects, the color of the blood, which is a bright red, and the flow isochronous with the cardiac systole, indicates hemorrhage from an artery. In other instances the hemorrhage may not occur, with all its distinctive characters. The opening of the wound is frequently too narrow, and the blood, not being able to make its exit without, collects within the tissues. When this occurs, a collection of arterial blood takes place within the tissues, and no distinct symptom is present which will allow of differentiating arterial from venous bleeding, unless direct auscultation over the wound gives some clue,—in which case a souffle isochronous with the cardiac systole is heard. Consequently, the injury of a large artery may be passed by unnoticed unless the condition of the pulse below the wound is examined. The absence of the pulse is a certain sign that the vessel has been opened, and may be present some time before any other symptoms of hemorrhage can be detected. As an example of this, I would mention the following case: A man fell on his left shoulder and a very extensive swelling of the arm occurred; the swelling fluctuated, the surface was violet, and the tumor extended from the axilla to the elbow. A careful examination showed that the head of the humerus was not in its proper place, but there was a question as to whence came this enormous collection of blood. No pulsation could be detected in the swelling, so it was doubtful whether or not there was a rupture of a large deep vein or a lesion of the artery. Here the pulse gave the answer, because it was entirely absent in the radial artery, and from this fact alone it was certain

that the brachial artery was involved, being either ruptured or compressed by the dislocated head of the bone.

In wounds from crushing seated at the root of a limb it is of the greatest necessity to examine the condition of the pulse at the lower extremity of the member. In these vast contusions the hemorrhage does not show itself, while hemostasis immediately takes place by a turning in of the internal and middle tunics of the vessel, which obliterate its lumen. The true symptom of the lesion is consequently to be found in the absence of arterial pulsation below the seat of the traumatism, and it is of the highest importance to look for this, because such an accident indicates a rapid interference, with a view to prevent the disorders which follow.

The same precaution should always be taken in fractures of the long bones, for it frequently happens that a splinter may wound an artery or a fragment may compress the vessel. The local circulation of the limb under these circumstances will be interrupted and will have the same consequences. For this reason one should ascertain whether or not arterial pulsation is present or not below the seat of the fracture, because immediate indications for operation are thus given in order that gangrene may be avoided.

It has occasionally happened that gangrene has been attributed to a badly applied dressing, to too much compression, when in reality it is the result of an arterial compression which has not been diagnosed, resulting from the fact that the condition of the pulse below the seat of fracture was not examined before the apparatus was applied.

There are other arterial lesions occurring without external wounds which present, perhaps, more difficulty in their diagnosis, and are often passed by unnoticed if the pulse is not examined. I refer to rupture of arteries which may arise in dislocations or when considerable traction is exerted on a limb. This accident occurs fairly frequently following manipulations necessary for the reduction of old dislocations, ankylosis, and so forth. Consequently, after these maneuvers the pulse should be examined.

After ligation of large arteries, such as the femoral, axillary, etc., the changes in the pulse below the ligature should always be noted. The amplitude of the beat indicates the way in which the collateral blood-supply has developed and whether or not it is suffi-

cient to give the necessary blood-supply to the limb. The same precaution should always be taken after the use of Esmarch's bandage, for it is necessary to see that the circulation has become reëstablished, since gangrene following a too prolonged compression has frequently been observed.

We now come to the important question of aneurysm, since the changes which this lesion produces in the pulse are one of the best diagnostic signs. Long ago these changes below the lesion were pointed out by Harvey and Hodgson, but of late years they have been studied with much precision, and their mechanism has been explained.

It is now generally admitted that a symptom of the greatest importance in the diagnosis of aneurysm is a marked weakness of the pulse below the tumor, and this occasionally gives a clue as to the vessel involved by the process. Instead of observing a sudden expansion of the artery, as is found normally, the finger can hardly feel the expansion of the vessel. Broca attributed this to the extensibility of the tumor, which, situated on the course of the artery, becomes distended by the arrival of the blood, whose force of impulsion is thus diminished, while Marey experimentally confirmed this theory. Thus, the degree of weakness of the pulse is in direct relation to the size of the sac, its degree of extensibility, and the size of the opening of communication with the artery,—all of which is most useful information for the surgeon. Besides this decrease in the arterial pulsation below the aneurysm, one also observes a very marked delay of the pulse on the side of the lesion compared with that on the normal side. In a large number of cases this has been found a constant sign.

When there is any doubt as to whether there is an aneurysm or a solid tumor compressing the artery, an important diagnostic sign may be derived from the effect on the amplitude of the pulse of compression and decompression of the tumor. If the tumor is an aneurysm the pulse will take on its normal characters, because, by diminishing the size of the pocket, its influence upon the circulation is weakened. On the other hand, if the tumor is solid and not connected with the vessel, being only in direct relation to it, compression simply increases the difficulty in the circulation, and will suppress the pulse-beat below the growth.

Obstetrics and Gynecology

THE CAUSATION AND TREATMENT OF ECLAMPSIA, WITH SPECIAL REFERENCE TO THE METHODS OF ACCOMPLISHING RAPID DELIVERY OF THE FETUS

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PERHAPS there is no place in all obstetric practice where the accoucheur stands on less certain ground than in the presence of eclampsia. The reasons for this uncertainty are apparent: In the first place there are several distinct symptoms-complexes which have been grouped together under the general term eclampsia or puerperal convulsions; second, we do not know the causes of any one of these various forms of convulsions; the pathology of all is only fairly well understood, and the pathologic chemistry of the cases is an absolute blank; and third, experience has proved more fallacious here than is usual in medicine, because at present there is no universally accepted line of treatment and not even approximate agreement on essential points.

Outside of the convulsions of epilepsy, hysteria, meningitis, brain tumor, etc., which may occur in the pregnant and parturient woman there are several clinical varieties of eclampsia. One may divide the cases clinically into two forms: the nephritic and the toxemic.

Women with chronic nephritis seldom have convulsions in pregnancy and labor. Not seldom other complications arise and threaten life or the patient's health, such as anasarca, uremia without convulsions, pulmonary edema, cardiac paralysis, cerebral hemorrhage and blindness. These, more than convulsions, cause us to interfere in the pregnancy. Convulsions, however, do occur.

They are uremic in origin and require almost the same treatment as does uremia in man.

A pregnant woman may acquire an acute nephritis from the same causes which a man would suffer. The pregnant woman's kidneys, however, are more susceptible to outward influences, and especially if they are already affected by the changes known as the "kidney of pregnancy" of Leyden. The nervous system of the pregnant woman is more labile, unstable, resembling in this respect the nervous system of children. As the result of these two conditions, acute nephritis is more common in pregnant women, and when it occurs, convulsions are more likely to be a prominent symptom. Owing to the disturbance of the abdominal circulatory conditions, and to the fact that the kidneys during pregnancy are bearing the additional burden of the fetal metabolism, and the gravid woman's own increased metabolism, the inflammatory reaction is likely to be more stormy and recovery improbable or at least delayed. When the uterus is emptied the handicap being removed from the kidneys, normal resumption of function is favored.

An apparently healthy gravida, suddenly, after exposure to cold, after a flagrant error of diet (a Christmas dinner, for example), or following an angina, develops an acute nephritis. These cases are the ones that come without much warning, and may occur in the practice of the most painstaking accoucheur, one who watches his patients carefully during pregnancy and makes regular examinations of the urine. It is not always easy to differentiate these cases from the true toxemic eclampsia.

The term toxemia in pregnancy means that certain toxins are developed in the pregnant woman—either abnormal products of metabolism, or the normal waste matters that are not excreted by the emunctories, and therefore accumulate in the blood. The clinical picture of so-called toxemia, with or without eclampsia, is very similar to that produced by certain alkaloidal poisons. The patient looks as if she were drugged, but the chemical nature of these poisons, where they are made, how they are absorbed, how eliminated, and their "physiologic action," all are little known and less understood.

The second class of eclamptics is the toxemic, and of these one may distinguish clinically several varieties. The most common

form is that classed by the later obstetric writers under the title toxemia of pregnancy. One will find edema of the extremities and eyelids, a pale waxy skin, hard, bounding pulse, small amount of urine, albuminuria, diminished urea, low specific gravity, hyaline and granular casts, but not the evidences of a real nephritis until the actual attack is near or has occurred. Then cellular casts appear with white blood corpuscles and blood. The patient complains of spots before the eyes, headache, anorexia, nausea and vomiting, pain in the pit of the stomach (a most important symptom), sleeplessness, or, rarely, a tendency to coma. Before the actual outbreak of the convulsions, the headache becomes intense, the patient sees sparks or colored lights, or becomes blind, and muscular twitchings herald in the storm. Consciousness is now completely lost. In these cases one is led to believe that the patient is suffering from some form of toxin which the kidneys are trying to get rid of, and failing to do this, the poison accumulates in the blood until the tolerance of the nervous system is overcome.

Where do these toxins originate? Many theories have been advanced. Halbertsma¹ believed that the uterus by compressing the ureters produced thus an urinemia. This is disproved for the majority of eclamptics by post-mortem examination. Now we could determine this point on the living by ureteral catheterization. Delore² suggested that bacteria might be the cause of the toxemia. Various bacteria were found in the blood and the placenta by Doleris, Blanc,³ and Favre;⁴ Gerdes⁵ found a bacillus which Hofmeister⁶ proved to be the common proteus, and Gley found *Staphylococcus aureus* and *albus*. The frequency of sepsis after eclampsia, the febrile nature of the disease, the fact that it may follow an attack of tonsillitis, that it occurs oftener in cold and damp weather, would argue for an extraneous, microbic origin. Stroganov⁷ states that eclampsia is an acute infectious disease introduced through the lungs. Many cases of previously healthy women who, after a few

¹ Muench. Med. Woch., 1887, Nr. 35, etc.

² Arch. de Tocologie, 1884, ii, 921.

³ Arch. de Tocologie, 1889 and 1890.

⁴ Virchow's Arch. Bd., 127 S. 133.

⁵ Centb. für Gyn., 1892, Nr. 20.

⁶ Centb. für Gyn., 1892, Nr. 51.

⁷ Centb. für Gyn., 1901, S. 1309.

days of prodromal symptoms, develop eclampsia, tend to make such an hypothesis very probable. However, up to the present no one has been able to isolate a germ that could be considered causative. Albert⁸ and Müller⁹ believe that the infection is in the genitals, and the toxins produced there (as from an endometritis) are absorbed and cause the convulsions.

Bouchard, in 1887, broke new ground when in his "Leçons sur les Auto-intoxications" he advanced the theory that eclampsia results from the accumulation of retained waste, which the emunctories failed to get rid of. His pupil, Rivière,¹⁰ believed that an overproduction of toxins occurred during pregnancy; that this was favored by hyperemia of the kidneys and liver, and that these poisons damaged the kidneys. He sought to prove these theories by determining the toxicity of the blood and urine in the eclamptic and non-eclamptic gravida. Other authors, Vollhard,¹¹ Schuhmacher¹² and Stewart¹³ disproved these theories. Then the liver was accused. Pinard, and Bouffe de Saint-Blaise,¹⁴ argued that eclampsia was a hepato-toxemia, due to liver insufficiency. Ahlfeld and Schmorl have found in cases of typical eclampsia, the pathologic condition of acute yellow atrophy of the liver, which brings me to mention the second form of toxemic eclampsia.

Occasionally the eclamptic woman will present almost the typical clinical picture of acute yellow atrophy of the liver. Her jaundice, the coma with jactitation and delirium, the diminution of liver dulness, and the uniformly fatal termination, even after the renal secretion has been fairly well established, point to some severe affection of the liver. I have in several instances been inclined to believe that the drugs employed in the treatment of the convulsions may have had something to do with the development of the fatal complication. In several cases in which large doses of chloral and chloroform had been administered, after apparent real improvement, the patient suddenly became delirious, with peculiar

⁸ Arch. für Gyn., Bd. lxvi, S. 483.

⁹ Ibid., S. 259.

¹⁰ Auto-intoxication eclamptique. Paris, 1888.

¹¹ Monatsschr. für Geb. und Gyn., Bd. v, S. 411.

¹² Hegar's Beiträge, v. 257.

¹³ Amer. Journ. Obstet., 1901, 506.

¹⁴ Annales de Gyn., 1891, xxxv, 48, and ibidem, 1898., l. 342, 482.

jactitation; jaundice supervened, with coma and death. Since several years, therefore, care has been exercised in the employment of such remedies.

Lange¹⁵ believed that the thyroid gland has much to do with eclampsia and by administering iodothyryn he cured the albuminuria of the kidney of pregnancy. Others have obtained favorable results with thyroid extract, but the theory has not awakened general interest. It has long been observed that the blood of eclamptics contains an excess of fibrin. This is probably not the cause of the disease, but is one of the effects of the common cause. The same may be said of the high arterial tension found usually early in the disease.

The idea that the child and placenta may be the origin of the toxins is not new. Ahlfeld¹⁶ mentioned it in 1894 and Fehling¹⁷ and Collman¹⁸ support this view.

In my opinion there is now no doubt that the fetus in utero may sicken independently of its mother, and either secondarily infect her or, after delivery, continue ill and die. The subject is at present under investigation, and as soon as sufficient cases and pathologic studies can be accumulated the results will be published.

It is more than probable that certain cases of eclampsia without albuminuria and other evidences of renal disease, and cases of nephritis or toxemia developing without warning in previously healthy women, may be found to be due to a diseased ovum. Bouffe de St. Blaise in 1888 saw a case of eclampsia in a molar pregnancy. Hitschman saw another in a girl pregnant 4½ months with a hydatid mole. These may be confirmatory of the above or they may mean that a live fetus is not necessary for the production of the convulsions. Eclampsia may occur with a macerated fetus. Is the macerated fetus cause or effect? Is the death of the fetus the result of the toxemia? These are only a very few of the questions which still remain unanswered in regard to eclampsia. Zweifel¹⁹ has found sarco-lactic acid in the urine of 17 eclamptics, in the blood, and in the fetal blood. He found lactic acid after a com-

¹⁵ Zeitsch. für Geb. und Gyn. xi. H. 1.

¹⁶ Lehrbuch der Geburtshilfe, iii Aufl., S. 235.

¹⁷ Verh. der Deutsch. Ges. für Gyn., 1901., S. 261.

¹⁸ Cent. für Gyn., 1897, Nr. 13.

¹⁹ Arch. für Gyn., 1905, Bd. 76. H. iii.

plicated chemical process in which it was crystallized out as paralactate of zinc. The crystals are very fine and long, grouped more or less characteristically. The lactic acid was absent from the urine of a case of pure uremia, but present in the blood of all children born dead, and in all the placentæ examined. These experiments are in line with the newer theories of acid intoxication. Zweifel has not proved that the lactacidemia is the cause of eclampsia, only that the lactic acid is present in the urine of eclamptics. This finding occurs also in cases of asphyxia, dyspnea, exhaustion from severe physical effort, some febrile conditions, and poisoning by morphin, curare, strychnin, veratrin, cocain, phosphorus, etc. Under these circumstances the theory is to be kept with the rest—unproven.

Finally may be mentioned the theory recently promulgated by a German writer, Dienst.²⁰ He tries to prove that when the blood of the fetus mixes with the blood of the mother eclampsia results. We have been taught that the maternal and fetal circulations do not communicate, and physiologically such a state of affairs would be hard to explain. It is with interest, therefore, that we await Dienst's further studies. By some authors eclampsia is believed to result from arterial spasm in the brain, when convulsions are the immediate result, or in the liver and kidneys when toxemia results, and the eclampsia secondarily. This arterial spasm is reflex and the reflex is believed to be inaugurated in the uterus. An overwrought nervous system, as is common in pregnant women, will therefore react with convulsions to an exaggeration of uterine irritation (twins, primiparity), and this is especially true if the nervous system has been poisoned. An external nervous shock may evoke the convulsions, of which I know two fatal cases. These cases would be classed under what some writers term *eclampsia reflectorica*. To this class, too, would be added those cases of one or two convulsions recurring at the end of labor or immediately after it; but I believe these are true toxemic eclampsias, the convulsions being elicited by the summing up of external irritations. A true eclampsia reflectorica does exist, and it may be recognized by the convulsion being single, the rapid recovery of consciousness, and the absence of urinary or toxemic findings.

²⁰ Cent. für Gyn., 1905., Nr. 12, S. 353.

The treatment of eclampsia is based entirely on empirical foundation. One can speak of a rational method of treatment only when the cause of the disease is known. As in most diseases, more may be accomplished by prophylaxis than by treatment. We are much handicapped after the convulsions have broken out because the nervous balance is overthrown. We cannot prevent the action of the primary cause of the eclampsia since we do not know what the primary cause is, but by carefully watching the pregnant woman we may discover the first manifestations of the action of such noxious influences and by appropriate measures either ward them off entirely, or interrupt the pregnancy before the disease reaches a climax. It is the pregnancy that favors the development of eclampsia. If we cannot prevent and cure eclampsia we can remove the pregnancy. If the uterus is emptied before the convulsions begin, as a rule, recovery is prompt. If the earliest signs of the impending catastrophe can be detected, emptying the uterus will almost invariably prevent a fatal issue.

The prevention in a general way is equivalent to the conduct of the hygiene of pregnancy. Every pregnant woman should be considered a possible candidate for eclampsia and all our efforts should be gathered together to save her. It is a fact that the pregnant woman is neglected. The physician considers his attendance at the delivery of the child as his most important function, when, as a matter of ordinary experience, his duties begin in the early months of pregnancy, and do not culminate with the end of the second stage of labor, but are real and onerous until both mother and babe are through the puerperium.

Every pregnant woman should engage her physician as soon as she thinks pregnancy has begun, and should place the responsibility for the proper conduct of her gestation, labor, and puerperium upon him. The physician on his part, must insist on the observance of such rules and prescriptions as he gives, on which depend so much the health and life of the two patients in his care.

At the first consultation the accoucheur obtains a full history of the gravida. The family history is important. Did the patient's mother have eclampsia? Were the parents neurasthenic, insane, alcoholic? Experience has shown many cases of convulsions in the children of such parents. A hereditary instability of the nervous

system may declare itself by abnormal metabolism which reaches its acme during the crucial test of pregnancy. Recently I lost a patient from eclampsia, whose mother had the disease in her first pregnancy, and Elliot ²¹ tells of a family in which a mother and four daughters died of convulsions. Eclampsia and puerperal insanity are often associated and are probably due to the same cause, toxemia. A history of puerperal insanity in the mother may be significant for the child.

The personal history of the pregnant woman from earliest infancy should be elicited. One of my patients had had infantile convulsions. Any acute infectious disease that might have left some damage on important organs should be noted. Such are scarlatina, diphtheria, tonsillitis, an abscess, typhoid fever, variola, acute rheumatism, etc. The frequency with which these diseases appear in the early history of eclamptics entitles them to more than passing notice. Occasionally one will obtain a straight history of nephritis or catarrhal jaundice which will put the accoucheur on his guard.

Eclampsia in a previous pregnancy will necessitate careful watching in the present one. A recurrence is not likely unless the first attack was due to nephritis or organic cardiac or liver disease. The kidney of pregnancy is not believed to be followed by a real nephritis, but a slumbering nephritis awakens sometimes as an acute parenchymatous inflammation which is hard to distinguish from the kidney of pregnancy. If the patient survives, the inflammation again becomes latent and may break out in the following pregnancy with increased intensity. If the patient recovers promptly from her first attack, and frequent, careful, general examinations show no evidence of damage to kidneys, liver, or heart, then one may expect with reasonable assurance that a subsequent pregnancy will be uneventful. Duehrssen ²² found a recurrent eclampsia in 1.5 per cent. of his 200 cases.

During the early months of pregnancy eclampsia is rare. I have had one case in which the convulsions appeared at the third month. Spontaneous abortion occurred with recovery. This patient has heart disease with nephritis. She had eclampsia again in her second pregnancy, at term.

²¹ Parvin, *Obstetrics*.

²² *Handbuch d. Geburtshilfe*, ii, 8.

Cases of nephritis show the symptoms of renal insufficiency early. The toxemias appear later. It is wise, therefore, to ask all pregnant women to seek medical attention as soon as the condition is suspected, and to put all patients on a regimen having the object of avoiding all the contributing causes of eclampsia.

The dress of the pregnant woman should be entirely free from circular constriction at any point. The corset must be discarded. Light flannels for summer and medium weight for winter are prescribed.

Proper exercise out of doors, regulation of the bowels, and hygienic physical, mental, and moral life are to be insisted on. I am certain that coitus in pregnancy causes many cases of hyperemesis, some of the cases of infection *in graviditate* and *sub partu*, and many abortions, and I believe that the nervous hypertension thus produced might even cause eclampsia.

Probably the diet during pregnancy requires the greatest supervision. Overeating should never be tolerated. The woman is not eating for two. Most people eat too much. The ordinary woman's diet is enough for the added demands of fetation. After the fourth month of pregnancy the gravida should subsist on a nearly vegetarian diet. One egg a day, or 3 ounces of meat, or 3 ounces of fish are allowable. Milk, buttermilk, koumiss, matzoon, and plenty of water are recommended. Highly spiced articles of food and tea are forbidden. These rules are simple and not distressful.

Proper rules for bathing should be enjoined. The next duty of the accoucheur is to watch for the first symptoms and signs of beginning renal inefficiency and toxemia.

If careful interrogation of the patient's history has rendered probable, even remotely, such occurrence, means must be instituted to combat this tendency, and upon lines shortly to be indicated. One may detect these early signs of toxemia by (1) examination of the patient, and (2) examination of the urine. Both examinations should be frequent. The patient is instructed to appear at the office often during pregnancy, and to report at once if she has nausea, vomiting, pain in the pit of the stomach, headache, spots before the eyes, tinnitus, nervousness, neuralgias, twitchings of muscles, insomnia or somnolence, swelling of the feet or eyelids, diminished excretion of urine, or constipation. In short, the general health of the gravida is the object of continual solicitous regard.

If any of the symptoms of toxemia be present a painstaking examination is made, including the pulse for increased arterial tension and the eye-ground for retinitis.

On the examination of the urine experience has taught me to rely less, though such examinations are not by any means neglected. Every month for the first six months and every three weeks for the latter third of pregnancy the urine is examined. If there is any suspicion of trouble, weekly and even daily tests are made. Albumin is the most important finding, next casts and cellular elements, then sugar, then specific gravity giving total solids, and finally urea. The patient is instructed to measure a day's urine every three weeks and report if the quantity is below three pints.

The presence of albumin is always of significance. Even though some authorities say it may occur in normal pregnancy, I have yet to meet a case in which other signs of toxemia or renal insufficiency were not associated with it. If the amount is over 0.1 per cent. (Esbach), there is occasion for anxiety, and the patient must be treated. The presence of a few hyaline, or an occasional granular, cast is of no particular significance. An increase in their number with the addition of cellular elements and cellular casts will show that an outbreak is threatening. There is sometimes a pre-albuminuric stage of nephritis, and one may stumble upon it with the microscope in this manner. White blood corpuscles, especially mononuclear leukocytes, show the presence of pyelitis or ureteritis, and give no concern here. Red and white blood corpuscles appear when the nephritis becomes acute, and often only after the convulsions have broken out. The amount of urine and the specific gravity will determine the excretion of total solids. Normally the pregnant woman passes sixty ounces of urine with a specific gravity of 1014, which will give the normal excretion of solids. When the amount of urine is small and the specific gravity low one must consider excretion deficient and institute measures to increase it. The urea index is not an entirely reliable guide to detect the presence of toxemia. It will follow more or less closely the total solids and gives the same indications for treatment.

If the first signs or symptoms of toxemia occur, treatment must be at once instituted. It will proceed along three lines: (1) The diet should be ordered so that just enough nitrogenous matter is

given to sustain life, in the form easiest assimilated, and that will leave the least amount of waste and by-products which throw extra work on the liver and kidneys. (2) The emunctories should be stimulated to throw off the surcharge of poisons already in the blood. (3) Should the above treatment not have the needful effect, should the evidences of renal insufficiency increase, or should the signs of a real nephritis appear, the induction of premature labor is not only justifiable but imperatively indicated.

(1) In aggravated cases of toxemia and when the kidney is involved in even a moderate degree it is well at once to put the patient to bed and allow nothing but water to drink. After three days, when improvement is apparent, an absolute milk diet is ordered. The French are the most ardent supporters of this treatment and in my hands it has given excellent results. As the condition improves, starches are added to the diet, then the proteid vegetables, with the vegetable oils and butter. If the improvement is progressive, full vegetarian diet with the milder fruits and one egg a day may be allowed. Later a little fish, chicken, or turkey is added, but never a full meat diet. Spices, tea, coffee, alcoholics, beef, veal, mutton, and pork are strictly forbidden. Water is given in large amounts unless the heart is already overloaded. Butter-milk, matzoon, and koumiss are recommended.

(2) One may increase excretion by the bowels, the kidneys, the skin, and the lungs. A brisk saline purge is given at the start and the bowels are kept open by salines, alternating with vegetable cathartics, as continuous administration of the former leads to anemia and headaches. Water is administered morning and at night on an empty stomach. It is both laxative and diuretic. Diuresis is favored by the ingestion of liquids, especially hot water in large amounts. This in combination with the milk diet does not fail to produce polyuria. Buttermilk is also given, but the vegetable diuretics and diuretin are not recommended.

The skin is to be kept free from chill by woolen undergarments, worn even in summer. If the symptoms of toxemia are pressing, twice daily hot wet packs are ordered, and alcohol sweats may be needed. Patients with weak hearts require watching while in a pack, as deaths are not uncommon. I have had several admonitory experiences, and I keep oxygen and other stimulants at

hand for such emergencies. Jaborandi is heartily condemned even when the patient is conscious, as it is dangerous and unnecessary.

A valuable means for starting the skin and the kidneys is the subdermal injection of 0.7 per cent. salt solution. It is used only in the advanced cases when eclampsia is threatening and quick action is needed. The withholding of salt from the diet has no effect on the kidney action. Fresh air in abundance aids excretion by the lungs, and the patient is instructed to fill and empty the lungs by very deep breaths in fresh air, ten times each morning and evening.

When treatment faithfully carried out on the lines here laid down has failed to produce sufficient amelioration of the symptoms, if the evidences of renal insufficiency persist or grow worse, and especially if a tendency to sleep, twitchings, or other symptoms of eclampsia threaten, the pregnancy should be terminated. The best method of inducing premature labor is to puncture the bag of waters. This may be aided by the insertion of a Barnes bag or the colpeurynter. All manipulations should be quickly carried out, and when any examination or other manipulation on the genitals is performed a light chloroform anesthesia should be induced. This rule obtains with double force after the convulsions have broken out.

The symptoms that in my opinion most surely indicate the near approach of convulsions, are headache, occipital or frontal, seeing colored lights or "spangles," twitching of the muscles, somnolency or insomnia, nausea and vomiting, *pain in the epigastrium*, subicterus, general edema of the body, high arterial tension, and marked albuminuria. Rarely one or the other symptom will stand out very prominently, or several may be absent. After the labor has been inaugurated it should be terminated as quickly as the conditions will permit, as experience has shown that eclampsia is less likely to occur post-partum after a quick delivery.

RAPID DELIVERY OF THE FETUS

When the pregnant, parturient or puerperal, woman has had the first convulsion the case at once assumes a most serious aspect. The nervous balance has been upset and one convulsion is likely to lead to another. The mortality of eclampsia is still from 20 to 45

per cent. for the mother and 30 to 60 per cent. for the child. Such high mortalities are shown by very few surgical complications, wherefore the patient deserves as much, if not more, consideration than does the surgical patient. Two physicians at least she should have and one or more good obstetric nurses. If a good maternity is nearby, she should be quickly transported thither; if not, the facilities of the maternity should be closely imitated at home.

There are three general plans of treatment, two extremes and one occupying a middle position. Duehrssen's dictum is, after the first convulsion, put the patient asleep, deeply, and deliver at once. The other extreme is put the patient to bed, give narcotics, stimulate the emunctories, etc., and wait the natural termination of pregnancy and labor. Those accoucheurs occupying the middle position use the medical treatment more or less and hasten the labor only if the patient's condition is evidently going from bad to worse.

It would be useless to discuss these three theses. For the first ten years of my practice I was neither extremist, but latterly, as the result of my own experience in 52 cases of eclampsia, and a thoughtful study of the literature, I have gradually been won over to the position held by Duehrssen, that is, rapid delivery—as rapid as is consistent with the safety of the mother. The discussion of the immediate treatment of the eclampsia then, is the discussion of the methods of rapidly dilating the cervix and emptying the uterus.

There are six methods in vogue for opening the uterus: (1) manual dilatation; (2) the use of hydrostatic bags; (3) the use of metallic instruments; (4) incisions in the cervix; (5) vaginal Cesarean section; and (6) abdominal Cesarean section. Which of these methods will be selected will depend, (1) on the condition of the cervix, as regards degree of effacement, shortening, and dilatation; (2) the time of pregnancy; (3) the environment of the patient; and (4) the skill of the attending accoucheur.

In primiparæ, when rapid delivery is to be performed through a non-dilated pelvic floor, the danger of extensive uncontrollable injury is so great that it is always advisable to make a deep vaginoperineal incision, a deep episiotomy. This was recommended by Jaggard in 1889.

If upon examination the cervix is found to be effaced and

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dilated, the membranes should be ruptured and the child delivered by forceps. If the head is not engaged version and extraction by the breech are indicated.

If the cervix is effaced, that is, shortened, but dilatation not complete, the thinned portion may be enlarged either by incisions or by digital dilatation. The latter is employed if only a little is left to dilate, the former when the os is small. The membranes are then ruptured and delivery accomplished.

If the cervix is neither effaced nor dilated (the latter without the former is being occasionally found in multiparæ) the case is formidable and the method of treatment is not so easy of selection and execution. (a) In a primipara the best results for mother and child are obtained by the vaginal Cesarean section, but the patient must be in a hospital and in the hands of a competent obstetric surgeon. (b) Under other conditions, the treatment recommended is, puncture the membranes, insert a Champetier de Ribes bag or a Braun colpeurynter, and by putting traction on the bag so dilate the cervix that delivery is soon possible. If necessary the enlargement may be completed by manual dilatation, cervical incisions, or the Bossi dilator. (c) Abdominal Cesarean section should be reserved for those rare cases of completely closed long cervix, with a living child at term, in which the child is unusually large or the pelvis small. (d) In a multipara with large soft cervix, the hydrostatic bag or the Bossi dilator or the manual method may be employed. If the cervix is long and rigid a multipara is to be treated like a primipara.

In all cases when the infant has succumbed craniotomy should be performed, as this reduces the degree of dilatation required.

Of the method of digital dilatation of the cervix little need be said. If the cervix is rigid and closed the finger will not succeed. If beginning to open, and softened, the fingers may dilate it. Harris uses one hand, other operators use the two. By gradual stretching the os is opened to admit three fingers, then four (Fig. 1). These are then placed back to back as in Figure 2 and by levering them against their opposites a strong expansive force is exerted. I believe that the cervix tears more or less in all these cases. The hydrostatic bag is without question the safest method of opening the cervix. The bags may, unless carefully

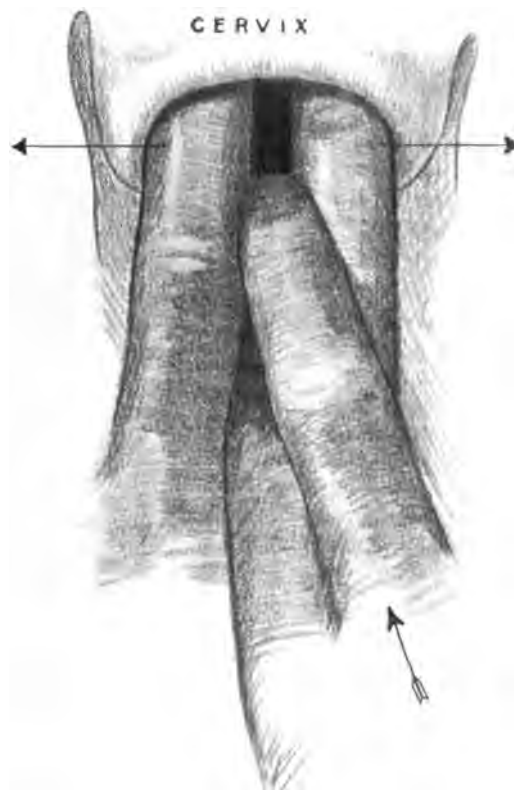


FIG. 1.—Dilating the os uteri by first insinuating two fingers of one hand, and then by forcing two fingers of the other hand between the first fingers, after the manner of a wedge, spreading them apart.

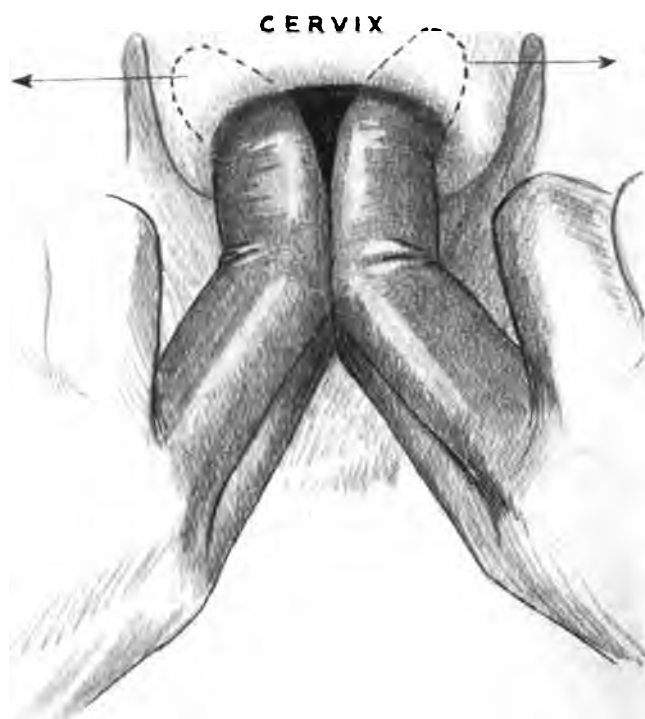


FIG. 2.—The cervix having been dilated sufficiently to admit four fingers, these are introduced back to back so as to form mutual fulera; by flexing the fingers strongly a firm dilating device is created.

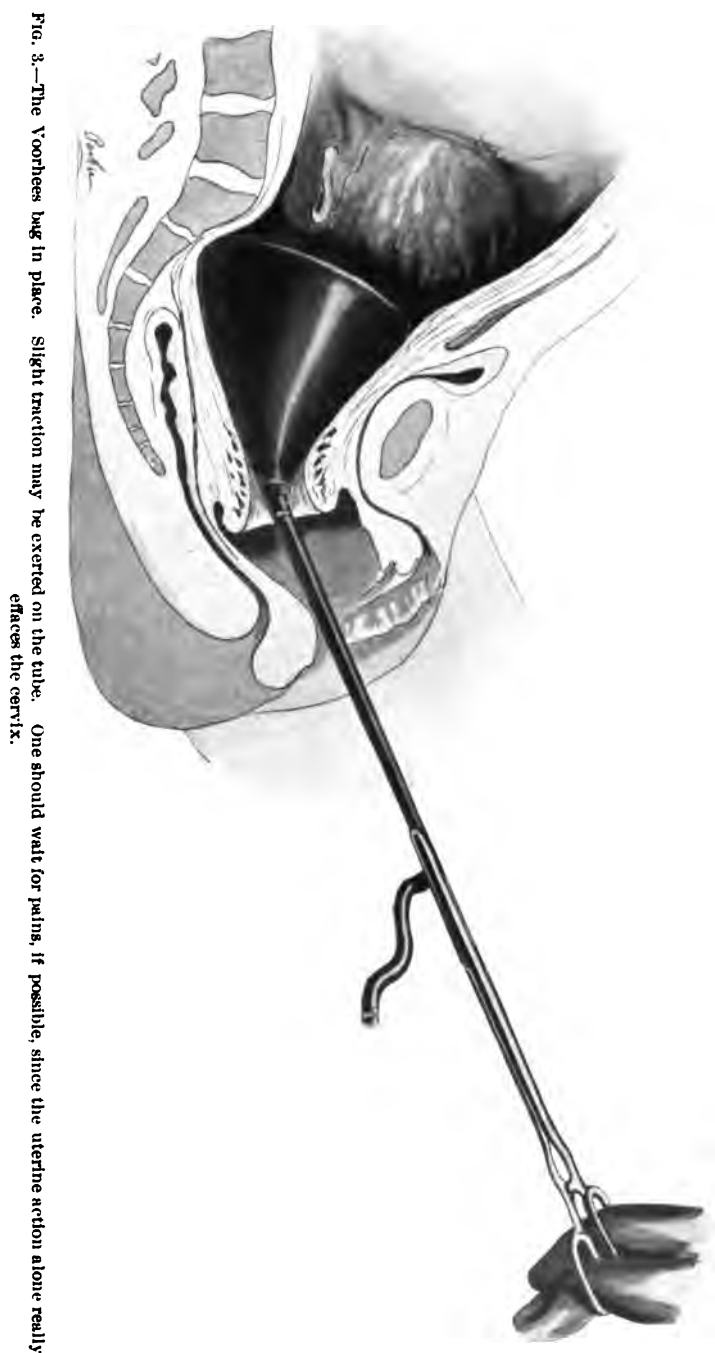


FIG. 3.—The Voortees bag in place. Slight traction may be exerted on the tube. One should wait for pains, if possible, since the uterine action alone really effaces the cervix.

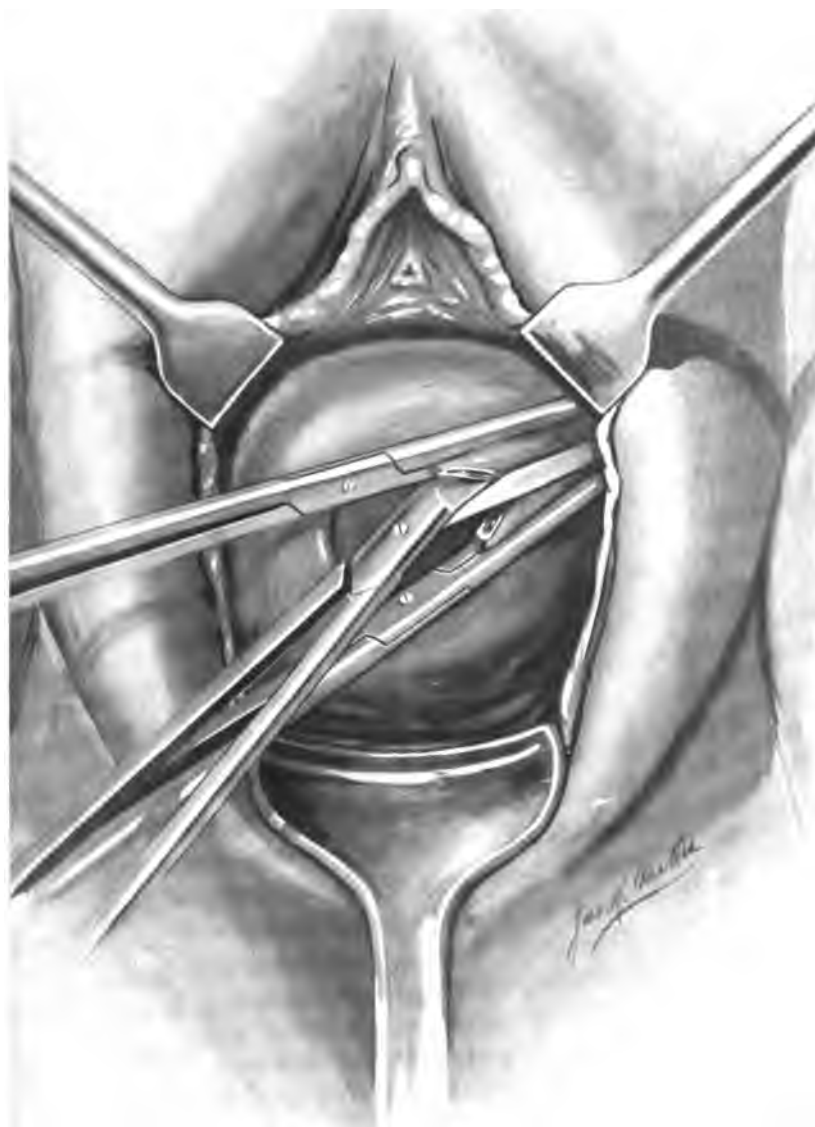


FIG. 5.—Duelissen's cervical incisions. Two eight-inch clamps are first placed at the sides of the proposed incision, which is then made with angular scissors—to the vaginal fornices.

employed, rupture the uterus. There are three commonly used, the Braun colpeurynter, the Champetier de Ribes inelastic bag, and the Voorhees bag—an American modification of the French style. The cervix must be dilated to at least the size of a quarter-dollar or the larger bag will not pass. A Goodell dilator may be used to start the enlargement.

The bag is folded into a long narrow roll, grasped by a curved uterine packing forceps and placed inside the ruptured membranes. The finger may be used as a guide or the cervix may be pulled down with vulsella and the bag passed by sight through a speculum. After the bag is in place the finger steadies it and it is filled by a rubber bulb syringe. Traction is exerted on the tube as in Figure 3. This traction mechanically dilates the cervix and also evokes strong pains, which efface the cervix. The bag is expelled in from 20 minutes to as many hours. Sometimes the pains are too strong and

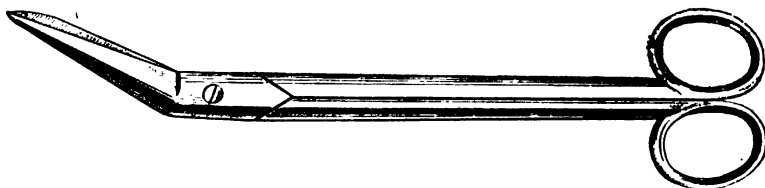


FIG. 4.—Angular scissors used for splitting the cervix.

in such cases less traction should be exerted and some of the water let out of the bag. Neglect of these precautions may allow a rupture of the uterus to occur.

The incisions in the cervix are only made after effacement has been secured, either naturally or by means of hydrostatic bags. The thin cervix is incised in four directions by means of angular scissors (Fig. 4). One may aid the cutting by clamping the cervix on each side of the proposed incision by means of 8 inch forceps (Fig. 5). The ends of the forceps reach to the fornices which also limit the length of the incisions. The cuts are made as illustrated in Figure 6. It has been recommended to make the incisions as in Figure 7, seeking thus to avoid the rectum, bladder, and broad ligaments. Dührssen, who invented the operation, performs it as first described.

The instrumental dilatation of the cervix is accomplished by branched dilators working on the principle of the glove stretcher. Bossi discovered the principle of constant elastic distention of the

cervix by means of a many-branched instrument and numerous imitators have entered the field. None has improved on the Bossi dilator except in simplicity of construction. They are all powerful and forbidding machines (Fig. 8) and may do and have done great damage to the maternal tissues. I cannot recommend the instrument, and this after using it in six cases.

Of all the methods to overcome the obstacle, caused by a closed uneffaced cervix, Duehrssen's vaginal Cesarean section is the best.

Following are the steps of the operation in detail, as I perform it:

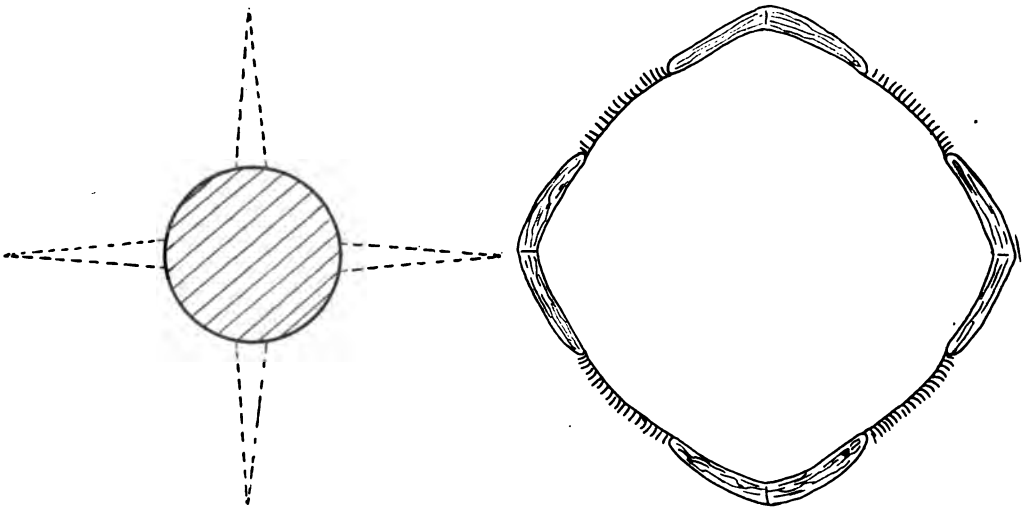


FIG. 6.—Duehrssen's method of incising the cervix, showing to the left the lines of incision, and to the right the enlargement of the cervix after incision.

An anesthetizer and at least two assistants are necessary. It is best to have three assistants, one to hold the speculum and one leg, one to assist with the sewing and to hold the other leg, and the third to thread needles and hand instruments. The lithotomy position is used, and a good horizontal light is necessary for accurate work.

If the parturient is close to the end of pregnancy and primiparous it is best to make a deep unilateral episiotomy, on that side to which the occiput points, if forceps are to be used; on the opposite side if version is to be performed. This will prevent laceration of the perineum during the subsequent delivery. If the episiotomy wound bleeds too freely it may be sewn up temporarily, the line of suture being at a right angle to the line of incision. A

short, broad speculum is now inserted to expose the cervix which is drawn down by means of two pairs of double tenaculum forceps. Incisions shown in Fig. 9 are made. The long cut extends to 1 cm. from the urethra, the short transverse cut encircles the cervix one-third of its circumference. Both go through the mucous membrane only.

The bladder is now separated from the cervix uteri, and the cervix freed partly from the base of the broad ligaments on either side. Care is necessary here not to go too far to the side as large veins may be encountered. The finger covered with gauze gently

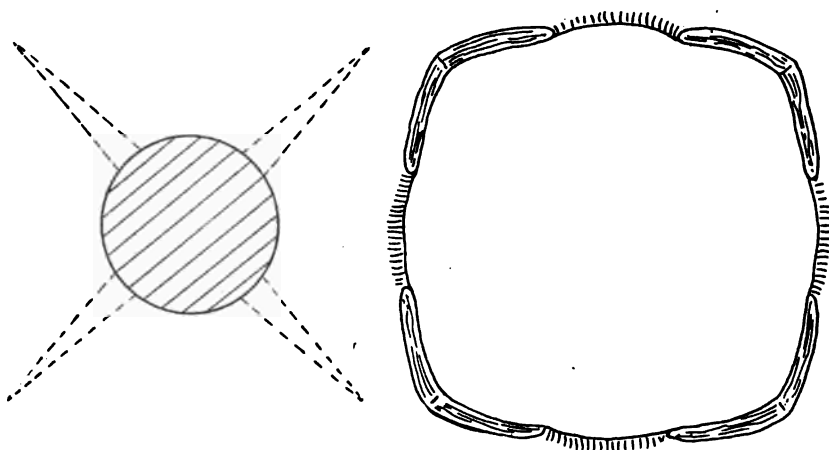


FIG. 7.—Alternate method of incising the cervix.

rolls the bladder from the cervix until the fold of peritoneum comes into view. The flaps of vagina are held away by the assistants, each corner grasped by an artery forceps.

After the bladder has been pushed up as in Fig. 10, the cervix is split in the median line with scissors (Fig. 11).

When the incision reaches near the peritoneum the tenaculum forceps are replaced by silk or gut strings, and successively higher portions of the anterior uterine wall are drawn down with the vulsellum forceps, and cut with the scissors (Fig. 12). In this way the lower uterine segment may be incised, as it comes down easily by traction made on the anterior wall alone. For a child weighing approximately three and one-half pounds the length of the uterine incision should be not less than 10 cm. If the cervix is already

partly dilated the incision need not be so large. If the woman is at or very near term, a posterior incision should also be made.

The posterior lip is grasped by two vulsella, and split down to the peritoneum of Douglas's cul-de-sac (Fig. 13). This is then pushed up from the cervix and the cervical incision prolonged as much as is considered needful. Duehrssen still insists on the additional posterior incision, especially with large children.

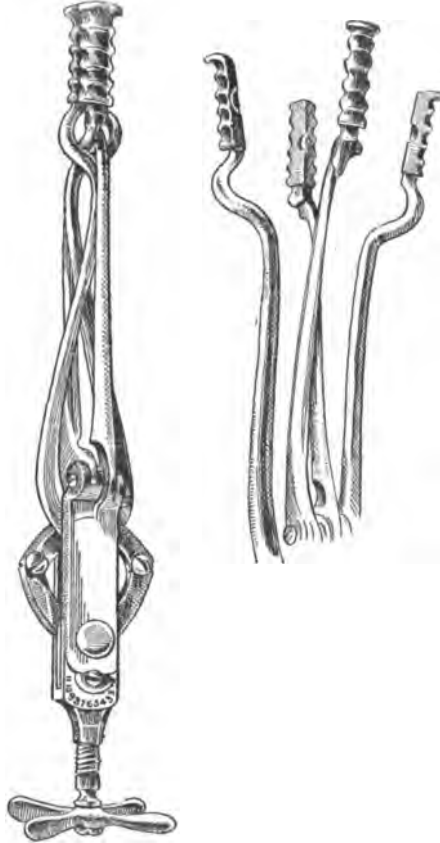


FIG. 8.—Boesi dilator.

The hemorrhage, during these maneuvers is not very profuse, and is controlled by firm traction on the cervix.

After the internal os is cut the bag of waters or the presenting part falls into the field. Having obtained access to the uterine cavity the delivery is rapidly accomplished. The placenta is quickly removed by hand and the uterus briskly massaged inside and out.

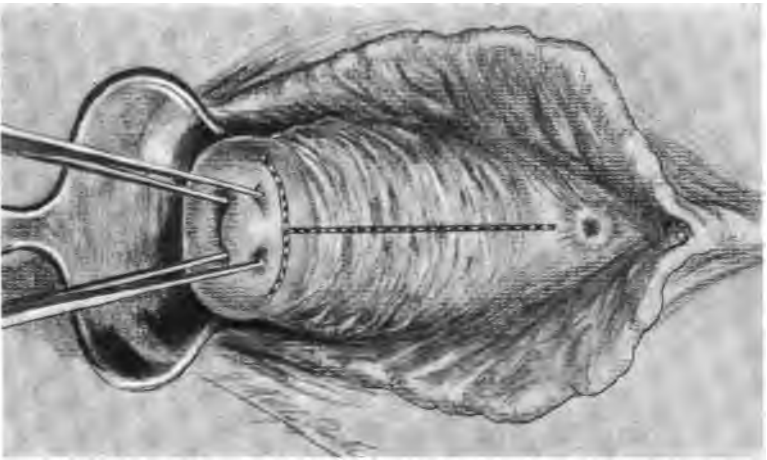


FIG. 9.—Vaginal Cesarean section. The line of incision.

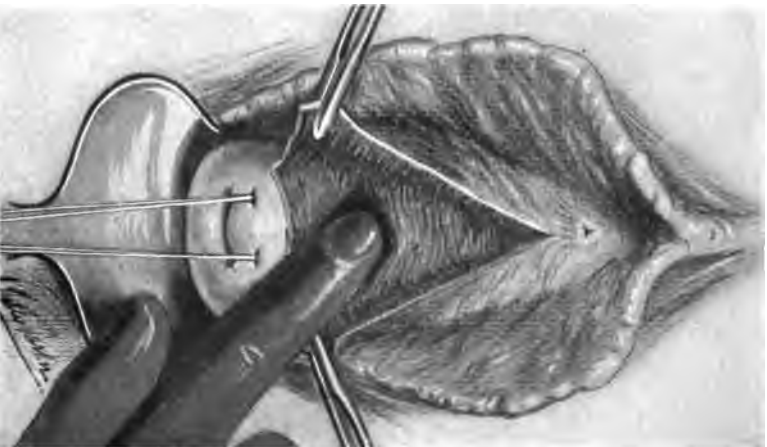


FIG. 10.—The vaginal wall has been incised and stripped back; the bladder is being pushed up; the finger is covered with gauze.

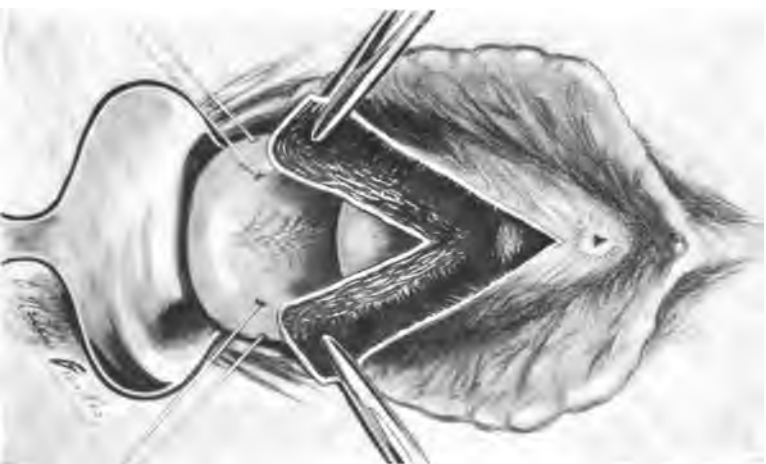


FIG. 11.—The uterus has been incised through the internal os; the bag of waters shows through; the bladder can be seen at the upper angle of the wound.

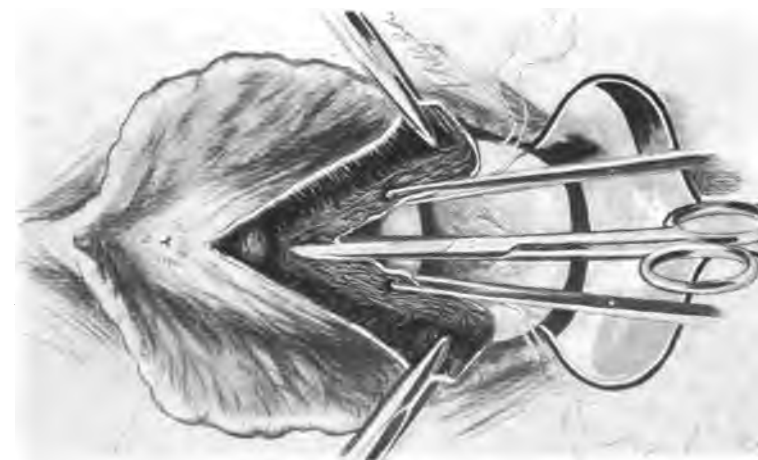


FIG. 12.—The cut edges of the uterine wound are being drawn down with bullet-forceps and incised with scissors. This incision lies in the lower uterine segment; the pouch of peritoneum is now in the upper angle of the wound.

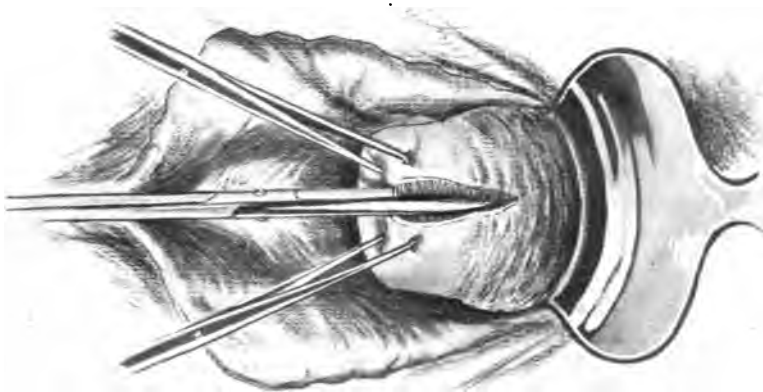


FIG. 13.—Incising the posterior cervix. One may, if he prefers, incise the vagina to the peritoneum of the cul-de-sac and then incise the cervix itself.

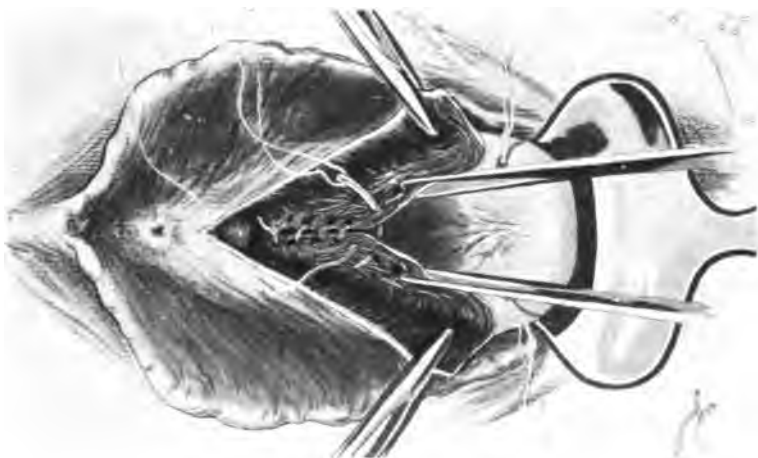


FIG. 14.—The first row of sutures is being placed. Over this a second row is to be inserted, assuring perfect coaptation, after which the vaginal incision is to be closed with a running catgut suture.

If labor pains have been present usually there is no hemorrhage, but if the uterus is atonic, it should be firmly tamponed with a long strip of gauze. Traction is now made on the string bridles, which brings the anterior wall of the uterus into view and lessens the bleeding. The tenaculum forceps are again used to draw down the upper angle of the uterine wound and a continuous catgut suture is applied for its closure (Fig. 14). The suture should grasp the whole thickness of the wall and the stitches should be close together. It is sometimes possible to place a deep layer and a superficial layer of sutures. Care is needed not to catch the uterine packing gauze in the needle.

After the cervix is sutured the vagina is closed with a continuous twenty-day catgut suture. A small drain of gauze is placed in the vesico-uterine space, and removed at the end of twenty-four hours.

If a posterior cervical incision has also been made this must be closed first, by through and through catgut sutures tied on the cervical mucous membrane. The vagina is closed separately with a running catgut suture tied on the vaginal mucous membrane. Then the anterior uterine wound is closed, as above described. Finally the perineum is repaired if necessary.

The after treatment is identical with that of a normal labor. Bladder disturbance is more common and more obstinate. It is a good plan to give urotropin prophylactically.

By means of this operation it is possible to gain access to the uterus quickly and at any period of pregnancy. The advantages of such a procedure may be readily appreciated even by those not in active practice as accoucheurs.

Certain objections have been raised against the operation. First, that the bladder or the peritoneum may be opened. Duehrssen has proved at post-mortems that such is not the case when the technic is properly observed, and Bumm²³ says that none of his 52 patients were torn beyond his incision.

Second, the danger of hemorrhage from the incisions and from the placental site. In the first instance the bleeding, experience has shown, is much less than one would expect, and by keeping in the middle line, not separating the tissues too deeply at the sides, and

²³ Report of Meeting at Kiel in June, 1905.

drawing the uterus well down, no danger has arisen from this source. During the delivery the child tampons the incisions. Post-partum hemorrhage, as not seldom occurs with abdominal Cesarean section, was occasionally annoying, but in all the cases was successfully controlled by gauze uterine tamponade. When the uterus is sutured the bleeding always ceases.

Third, it was feared that the uterus, in subsequent pregnancy and labor, would be likely to rupture. Two cases of labor have already been reported, in neither of which was trouble noted. Examination after recovery has shown that the wounds heal well and leave little scars. V. Bardelben²⁴ in a recent article reports the results of his examinations made months after operation. The findings were very satisfactory.

To enable one to deliver rapidly it is not alone necessary to enlarge the cervix; the resistance of the perineum must, in primiparæ, also be overcome. If the perineum is rigid and unprepared, it should be incised. The episiotomy must be deep and should go through the levator ani. One blade of the scissors is laid in the vagina to one side of the posterior columna rugarum, the other rests on the perineum with the point directed one-half inch from the side of the anus; the angle of the cutting edges of the blades should lie on the center of the fourchette. A bold cut is now made as is shown in Figure 15. If necessary this incision may be extended well down into the ischio-rectal fossa. The idea is to direct the eventual laceration along lines of safety, especially of safety to the sphincter ani. After the delivery the incised structures are carefully reunited, having due regard to coapt like structures (Figs, 16, 17, and 18). This deep episiotomy is a very useful procedure.

Other means of treatment are frequently employed as adjuvants, and after the uterus is emptied. Some are vaunted as specifics, but I must confess with regret that they often prove useless in the bad cases and in the favorable cases have not apparently contributed much toward the successful outcome. Narcotics, especially morphin in large doses, as recommended by G. Veit, and choral, as given by von Winckel, are capable of great harm, and I use them sparingly. In cases of threatened eclampsia ten grains of chloral hydrate and twenty of bromide of sodium are given three times a day to reduce the excitability of the nervous system.

²⁴ Cent. f. Gyn. 1904, Nr. 46.



FIG. 15.—The line of incision in episiotomy. The heavy line indicates a small cut, the finer lines the prolongation, if a deep incision is necessary. It is best to make the incision at the beginning as long as will be necessary.

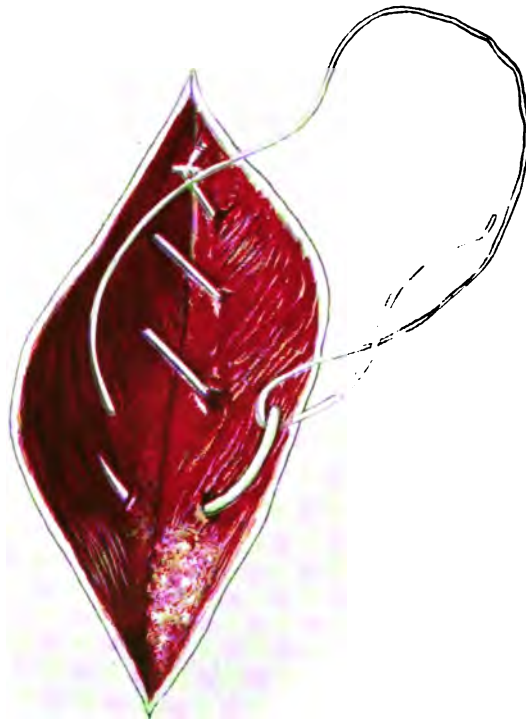


FIG. 16.—The first row of deep sutures (of buried catgut) being introduced. The side of the sphincter ani and the ischio-rectal fat are visible in the lower angle of the wound.

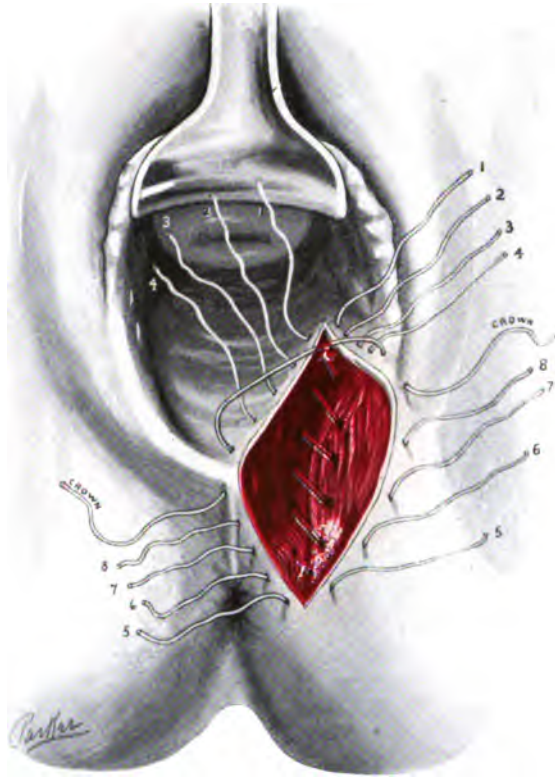


FIG. 17.—The final sutures in place. These are of silk-worm gut, and are numbered in the order of their introduction. The crown suture is introduced last. All of the vaginal sutures are tied before the cutaneous sutures are introduced. As much tissue is grasped in the suture as will give a firm body. The finger in the rectum guides the needle in safety through the deep recesses of the wound. This finger is covered by a special finger cot.



FIG. 18.—Special finger cot for covering the finger when introduced into the rectum to guide the needle used to introduce the sutures to repair the episiotomy.



FIG. 19.--The use of a clothespin to prevent laceration of the tongue in eclampsia. It is wise to have the clothespin, covered with a handkerchief, gauze, etc., attached to the bed, as in the illustration.

After the convulsion has occurred, while waiting to terminate the pregnancy a quarter of a grain of morphin is given hypodermically, and during the operative delivery and any vaginal manipulation chloroform is administered to the surgical degree. I would warn against too liberal use of chloroform and chloral. Both cause liver degeneration, and eclampsia does also. Two deaths in my practice were, from clinical evidence, due to acute yellow atrophy of the liver, after the convulsions had apparently been controlled. Bevan,²⁵ recently collected many cases of late chloroform death. The picture strongly resembles acute yellow atrophy of the liver. *Veratrum viride*, sometimes called the American remedy, has been weighed in the balance and found wanting.

Salt solution administered hypodermically and per rectum does aid the action of the skin and kidneys; as a specific, however, it is a painful failure. Combined with bleeding, in "washing the blood" much good was hoped from it. In the bad cases it does not help. As an adjuvant, however, I recommend it in all cases. Care is to be observed not to overload an already over-burdened heart.

Bleeding is again coming into its own. Jaggard in 1889 unqualifiedly condemned it. Latterly many voices are raised in its behalf. In the practice of the older country practitioner it has always had an honored place. In cases in which the convulsions recur frequently in spite of treatment, in which the pulse is full and strong, the face flushed or cyanotic, in short, when the picture might be called sthenic or apoplectic, bleeding will do good. In cases of the opposite type, bleeding is a procedure of doubtful utility. Stimulation is here more desirable. When the evidences of cardiac engorgement are present, and pulmonary edema threatens, bleeding with powerful stimulation may tide the patient over.

Oxygen is another adjuvant. It should always be used in the form of pure fresh air, and a great deal of it,—a point frequently neglected while the oxygen tank stands in the stuffy room. Oxygen is given during the convulsion and right after it, to relieve as quickly as possible the cyanosis, and it is valuable also as a heart support. Aid elimination. To cause vicarious excretion of the eclamptic poison we stimulate to action all the emunctories. Cathartics have perhaps the best effect. They may complicate the delivery if given

²⁵ Jour. Amer. Med. Assoc., 1905.

before, by the flood of liquid feces inundating the field of operation which may lead to fatal infection. For this reason one had better wait till the uterus has been emptied.

Diaphoretic medicines are useless, and jaborandi positively dangerous. Hot wet packs are the best for stimulating the skin. They are depressing. Death has resulted from them. The patients need watching while in them. This measure also is best applied after delivery, and at intervals of not less than six hours.

Diuretics are too slow. Irritating diuretics are harmful. Water in large quantities acts well in stimulating the kidneys, given as hot lemonade or plain. Salt solution by the hypodermic method is by far the best diuretic we have. It stimulates the skin also.

The surroundings of the patient require some supervision, as much can be accomplished by attention to minor details. The patient should be protected from the vehemence of the convulsion. She should be kept as quiet as possible, in a soft bed, in a darkened, noiseless room. There should be no jarring of the bed, slamming of doors, swishing of starched garments, talking, etc., etc. The patient may be disturbed only when absolutely necessary. She must be attended constantly by one competent person.

A most important detail is the prevention of injury to the tongue. I have had patients in whom the tongue was so swollen and bruised that intubation became necessary. The septic mouth later may lead to pneumonia. A simple device for preventing injury to the tongue and teeth is pictured in Figure 19. An ordinary wooden clothespin, covered with a handkerchief, sewed on, is placed between the teeth during each spasm. The elastic prongs of the clothespin take up the spasmodic contractions of the jaws and the tongue, gums, and teeth are thus preserved from injury. The clothespin must be kept close by, so as to be immediately at hand when the convulsion commences.

For the sake of completion may be mentioned the use of thyroid extract, as introduced by Lange; lumbar puncture, suggested by Helme, of Manchester; and stripping off the renal capsule, as suggested by Edebohls.

In general it may be said that all the resources of the medical art are to be employed in the treatment of this formidable disease, and at the same time one must not overdo, as it is possible to err with too much zeal.

CHORIO-EPITHELIOMA MALIGNUM IN A PREGNANT UTERUS; RUPTURE OF THE UTERUS; ACUTE HEMORRHAGE

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THE following cases of chorio-epithelioma malignum occurring with pregnancy in progress and attended by rupture of the uterus and severe hemorrhage, simulating the rupture of an ectopic gestation, is reported owing to its rarity:

Mary W., aged 23 years, married, entered the Boston City Hospital on December 25, 1904, suffering from what appeared to be a ruptured extra-uterine pregnancy, and such was the diagnosis made at the time of operation.

She had always enjoyed good health. Three years previously there had been an accidental miscarriage at three months, and one year later, she was delivered at full term. The convalescence from both pregnancies had been uneventful. In September 1904 the catamenia appeared for the last time and there were symptoms of pregnancy. During October, from time to time, she suffered sharp attacks of pain in the left lower abdomen, which lasted a few hours and then disappeared. There was no vomiting during these attacks and the patient lay in bed or on a lounge until the attacks gradually passed away. Three weeks before entrance there was a similar attack, although between October and the first week in December she had been free from them. On Christmas morning she was seized with severe pain throughout the abdomen, felt faint and began vomiting, which continued until sent to the hospital by her physician. The pain was most severe in the left lower quadrant.

On admission the patient was a well developed and nourished woman, showing signs of shock and acute hemorrhage. Her temperature was subnormal, and the pulse weak and rapid. The heart and lungs were negative. The abdomen was slightly distended and rigid, with signs of free fluid in the peritoneal cavity. The vagina was slightly blue but otherwise normal, the uterus en-

larged, the cervix soft; and resistance was felt in the vaginal vault.

I operated as soon as the patient could be prepared, and found the abdomen filled with free blood to such an extent that it ran out over the towels from the incision. The lower flanks and pelvis were filled with laminated clots of various ages, showing that repeated hemorrhages had taken place. Those in the pelvis were the oldest; the hemorrhages from which they arose having evidently taken place some days previously. None of them was organized. After the blood and clots had been partially cleared away, a rupture was found in a dome like mass projecting from the fundus of the uterus. In attempting to raise the uterus a small fetus of about 3 months popped out from the rent, and the inside of the mass appeared to be lined with the fetal membrane. It was at first thought to be a rupture of the uterine end of the tube; but on inserting the finger and removing the membrane, the cornu was felt to be intact. As the patient could bear no prolonged operation, an elliptical incision was made and the ragged mass excised. To bring the wall together it was necessary to sacrifice the left tube. Nothing abnormal was recognized in the feel of the uterus. The uterine wound was closed with catgut sutures which reached to the mucosa and included the whole muscular wall.

The abdomen was closed without drainage, after irrigation with salt solution. Aided by stimulation and subcutaneous infusions of saline solution the patient rallied and made a good recovery; but during the time which elapsed, while waiting for the pathologic report, a bloody, rather foul vaginal discharge was present.

The excised portion showed the process in the uterine wall to be chorio-epithelioma malignum and it was decided to perform a complete hysterectomy.

On January 4, 1905, this procedure was carried out by the combined method with every aseptic precaution. The wound in the uterus was found to be quite firmly healed with a portion of the sigmoid flexure slightly adherent to the scar. The temperature began to rise on the day of operation and on January 7, there were two chills; the temperature rising to 105° F. On the next day some pus was found in the abdominal wound and the vaginal gauze was foul. As soon as drainage was established, the patient seemed to improve; but after about ten days she commenced to fail

rapidly and died on January 18, very suddenly. However, no metastases could be made out in any part of the body by physical examination. Although there was infection of the abdominal wound, it seems probable that metastases were already formed elsewhere in the body, as while apparently recovering from the infection, the anemia was progressive and the cachexia constantly increased. Unfortunately, owing to a misunderstanding, no autopsy could be obtained.

The neoplasm arising from the epithelium of the chorionic villi, now commonly known as chorio-epithelioma malignum, but which has been variously known as deciduoma malignum, sarcoma deciduo-cellulare, syncytioma malignum, and carcinoma syncytiale, was first described by Chiari¹ in 1888 who pronounced the growth uterine cancer. Sanger² although publishing his early case in 1889, first called it to the attention of the profession at large, by a paper read before the Gynecological Congress at Berlin in 1892, under the name of sarcoma uteri deciduo-cellulare, supposing the growth to arise from the decidual cells of the uterine mucosa; and in 1893,² he brought together, in an exhaustive monograph, all that was known up to that period. At about the same time that Sanger first made his work known, Pfeifer³ published his own investigations upon the same subject, which apparently agreed with those of Sanger, as to the nature of the growth.

Gottschalk,⁴ in 1894, combatted Sanger's views, maintaining that the starting point was in the fetal tissues; that is, the cells of Langerhans and the syncytium of the chorion. He considered it a sarcoma. L. Frankel,⁵ in 1895, described the cellular origin of the neoplasm; but apparently considered the syncytium as derived from the uterine mucosa.

Williams,⁶ in 1895, published the first monograph in this country, containing a report of his case and 24 others collected from literature. Marchand,⁷ in the same year, published the results of his work, and in 1898 first proposed the name of chorio-epithe-

¹ Wiener med. Jahr. d. Kinderheilkunde, Gesell. d. Aerzte, 1887, Bd. vii.

² Centralbl. f. Gynak., 1889, S. 132; Archiv. f. Gynak., 1893. Bd. xlv, S. 89.

³ Prag. med. Wochenschrift, 1890, No. 26.

⁴ Berlin klin. Wochenschrift, 1893, No. iv, S. 87; Archiv. f. Gynak., 1894, Bd. xlvi, S. 1.

⁵ Archiv. f. Gynak., 1895, Bd. xlviii, S. 80.

⁶ Johns Hopkins Hosp. Rep., 1895, vol. 4, No. 9.

⁷ Monatsschr. f. Geb. u. Gynak., 1895, Bd. 1, Heft. v, Zeitschr. f. Geb. u. Gynak., 1898, B xxxix, S. 173.

lioma, claiming that the growth originated from the epithelium of the chorionic villi. To his conclusions most writers assent, with the exception of Veit⁸ and a few English pathologists, who consider the growth as of maternal origin and sarcomatous. In the recent papers of Teacher⁹ and Bland¹⁰ will be found an interesting résumé of the subject.

Dorland,¹¹ in 1897, was able to collect 52 cases; Marchand, in 1898, 59, adding 2 of his own; Metoz,¹² in 1901, gathered 98; Ladinski,¹³ in 1902, 132; and Teacher, in 1903, 188 cases from medical literature. Of late, the reports of this neoplasm have become very frequent.

As chorio-epithelioma arises from the epithelium of the chorionic villi, it almost invariably appears during the years of active sexual life, although in one instance it is recorded at the age of fifty-eight years. It occurs after full-term labor, abortion, extra-uterine pregnancy and especially after the expulsion of a hydatidiform mole. Fränkel states that there is a previous history of mole in 50 per cent. of all cases, and Teacher's series shows about 39 per cent. Marchand describes the mole as due to an increased growth of syncytium and a proliferation of the cells of Langerhans; therefore, the pathologic relationship between the hydatidiform mole and chorio-epithelioma must be very close. Young women seem most liable to attack, as Ladinski found the average age in 124 cases to be 32 years.

Patients in whom it is developing convalesce poorly and remain anemic and sallow. Occasionally bloody lochia persists after the uterus is emptied and there is progressive loss of weight, strength, and color. More frequently, from a few days to six months intervene between the close of pregnancy and the beginning of the hemorrhages. From the history in a few instances (McCann¹⁴) the cells may remain latent for some time. Such a question might arise in connection with the case reported. Occasionally the metrorrhagia is so severe at the start as to endanger life. The loss of strength, emaciation, and anemia progress steadily; the uterine

⁸ Das Deciduoma malignum. Handb. d. Gynäk., Bd. iii, No. 2.

⁹ Trans. Obstet. Soc. of London, 1903, vol. xlv, p. 256.

¹⁰ Jour. Amer. Med. Assoc., 1905, vol. xlv, p. 1827.

¹¹ Univ. Med. Mag., 1897, vol. ix, p. 696.

¹² Du déciduome malin. Thèses de Paris, 1900; Rev. de Gynécol., 1901, vol. v, p. 557.

¹³ Amer. Jour. Obstet., 1902, vol. xlv, p. 465.

discharges become foul, hemorrhages frequent and severe, and pieces of tissue are often forced from the uterus, accompanied by cramp-like pains. Finally symptoms of sepsis supervene—chills, fever, sweating, and the dusky skin.

As metastasis occurs through the medium of the blood-vessels, it usually occurs early and may be the first manifestation of the growth. Dorland and Metoz report them in 70 per cent., and 90 per cent., respectively. In Williams' case they appeared in the vagina one week after a full-term delivery; and in a case reported by Poten and Vassmer,¹⁵ before the extrusion of the mole. Schmorl¹⁶ reports a wide-spread metastasis with no growth in the uterus itself—the neoplasm being probably thrown off with the placenta. The case of Bulius¹⁷ is the only one which I have found with a fetus in utero at the time of the manifestation of the disease.

The lungs and vagina are most commonly the seats of metastases. In Dorland's series, metastases were found in the lungs in over 78 per cent.; in the vagina in 54 per cent.; in the kidney, ovary, and spleen in 13.5 per cent.; in the broad ligament, liver, and pelvis in 10.8 per cent.; and in the brain in 5.4 per cent.

As chorio-epithelioma is the most malignant and rapidly growing neoplasm known, its early diagnosis is a matter of extreme importance. Persistent lochia, progressive anemia, loss of flesh or strength after childbirth, miscarriage, or the extrusion of a mole, should put the attendant on his guard. Likewise the cause of persistent pain, foul uterine discharges, irregular hemorrhages, or even increase in the size of the uterus, beginning shortly after the close of pregnancy, should be sought out at once and not left to chance.

The os is usually patulous and by carrying out exploration with the finger there is less danger of missing the small nodules in the fundus, to which, in its early stages, the growth is often confined. In the later stages, the enlarged uterus may occasionally bring up the question of a new pregnancy; and as ulceration of the friable growth takes place, it is often impossible to distinguish between it and sarcoma or sloughing fibroid. The microscope must always decide the diagnosis. Rupture or perforation was observed in a few of the cases reported in a few instances.

¹⁴ See Ref. No. 10.

¹⁵ Archiv f. Gynäk., 1900, Bd. lxi, S. 205.

¹⁶ Centralbl. f. Gynäk, 1898, No. 8, S. 169.

¹⁷ Verhandl. d. deutsch. Gesell. f. Gynäk., 1897.

Metastasis in the lungs may cause bloody sputum, dulness, pleurisy, etc., while metastasis in the brain has resulted in hemiplegia. There is not always that ease of diagnosis which some writers would lead us to expect. The feel of the tumor is usually soft and friable, occasionally hard and nodular, and often polypoid in form. Uterine cancer may present similar appearances; while in its later stages, sarcoma and sloughing fibroid simulate the soft ulceration of the uterine wall. The history itself cannot always be reliable; so that any case presenting possibilities, demands radical treatment, if after appropriate measures, the hemorrhages persist. Microscopic finding in such instances may be misleading and we should not depend upon them alone. Palpable metastases may occasionally call attention to the nature of the uterine tumor. Croom¹⁸ reports one case in which the examination of a tumor of the labia, supposed to be a cyst of Bartholin's gland, gave a clue to the diagnosis.

As metastasis occurs so early, immediate operation is imperative, but at the same time, it is occasionally delayed and we need not always despair. Hubbard¹⁹ reports a case in which the abortion occurred in May 1901; the first severe hemorrhage in the following October; and the radical operation was not performed until January 28, 1902. This patient is now alive and well.

The prognosis in all cases is extremely grave, although as has been previously said, the patient may survive from three to six months. The mortality in Dorland's series was 70 per cent., and in Ladinski's larger series it was reduced to 59 per cent. With early diagnosis and immediate operation the death-rate will undoubtedly decrease. Of 66 patients, who underwent radical operation, Hubbard reports a mortality of 24 per cent.

In Teacher's series of 188 cases, of 87 women remaining unoperated or without any radical procedure, 83 died; the fate of 2 was unreported; and in 2 there was spontaneous recovery.

Radical operation was carried out in 99 cases with 36 deaths—11 shortly after operation and 25 at longer intervals. After 6 months, 32 patients were well; after one year, 24; after 2 years, 13. A few patients recovered after incomplete operations, and even when metastases seemed to be present in the lungs and other parts.

¹⁸ Med. Press & Circ., London, 1902, vol. lxxii, p. 675.

¹⁹ Boston Med. & Surg. Jour., 1902, vol. cxlviii, p. 435.

Only 5 suffered a recurrence after a lapse of 6 months from the time of operation. Treated by radical operation, those cases in which the chorio-epithelioma appeared after hydatidiform mole, present a mortality of 78.5 per cent.; after abortion, 55.5 per cent.; after confinement, 47.3 per cent.; and after tubal pregnancy, 50 per cent.

Teacher concludes from his study of the subject that:

"While the impression conveyed by the figures is probably too favorable, it seems reasonable to conclude that operation offers a fair chance of recovery, and, further, that it may be done with some prospect of success in the face of the gravest signs of disease, and even of metastasis, having occurred."

The treatment of all cases should be that accorded to malignant disease.

The interesting points in the case reported herewith are the long time elapsing since the previous pregnancy and the presence of the growth with pregnancy in progress.

The question naturally arises as to whether the growth started from the fetal cells of the final pregnancy or whether some tissues remaining from the previous pregnancy were fanned into life. The question might also be considered as to whether the rupture was due to the thinning of the diseased uterine wall by the cells of the chorion during the processes of implantation of the ovum, for we know that such a process exists (Minot²⁰). The examination of the specimen made it apparent that the latter must be answered in the negative, and that rupture was due to the stretching and thinning of the affected portion of the uterine wall by the increase in size of the fetal envelop. The former question, unfortunately, cannot be answered.

I am indebted to Dr. F. B. Mallory of the Pathological Department for the appended report of the specimen submitted to him for examination, and also for the micro-photographs. The drawing shows the condition found on opening the abdomen at the first operation, except that the uterus is slightly smaller, owing to the removal of the fetus and membranes.

PATHOLOGICAL REPORT BY DR. F. B. MALLORY.—Specimen (S-05.937), received in alcohol. It consists of two parts, a fetus

²⁰ Trans. Amer. Acad. Sciences, 1904.

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and a portion of the fundus of the uterus. The fetus is well formed and measures 9 cm. in length. Histologic examination shows the tissues well preserved. The portion of the uterus received measures 5.5 cm. in width, 3.5 cm. in thickness, and 5 cm. in length. It has attached to it on one side the left oviduct which is of normal size and appearance (Fig. 1).

Projecting from the inside of the specimen at the lower end is a ragged mass composed of chorionic villi enclosing the fetal membranes. Along the upper surface of the uterus, running diagonally from before backward, is a ragged rent 5.7 cm. long and 2 to 3 cm. in width, from which project chorionic villi, blood

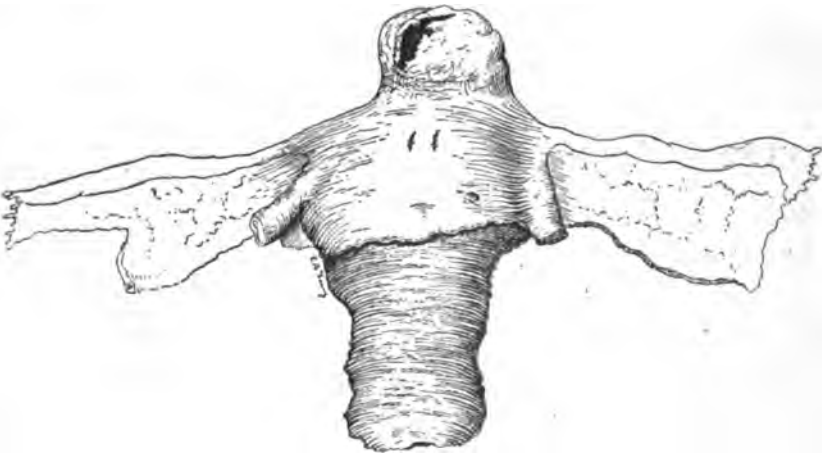


FIG. 1.—Appearance of the uterus after expulsion of the fetus.

clot, the umbilical cord, and the torn edge of the fetal membranes. The wall of the uterus surrounding this rent thins out to nothing. One end of the rent comes to within 1 cm. of the proximal end of the oviduct.

In the uterine wall 1.5 cm. distant from the rent and 5 cm. from the oviduct is a thin-walled, bulging area measuring 2.2 by 3 cm. On section the wall over this area is as thin as paper and lined within with a laminated clot 7 mm. in thickness. At the lower end of the specimen the uterine wall measures a little less than 1 cm. in its thickest part and grows rapidly thin as it approaches the rent and the thin-walled bulging area.

Histologic examination of the sections (Fig. 2 and 3) prepared from various parts of the specimen, particularly where the wall is

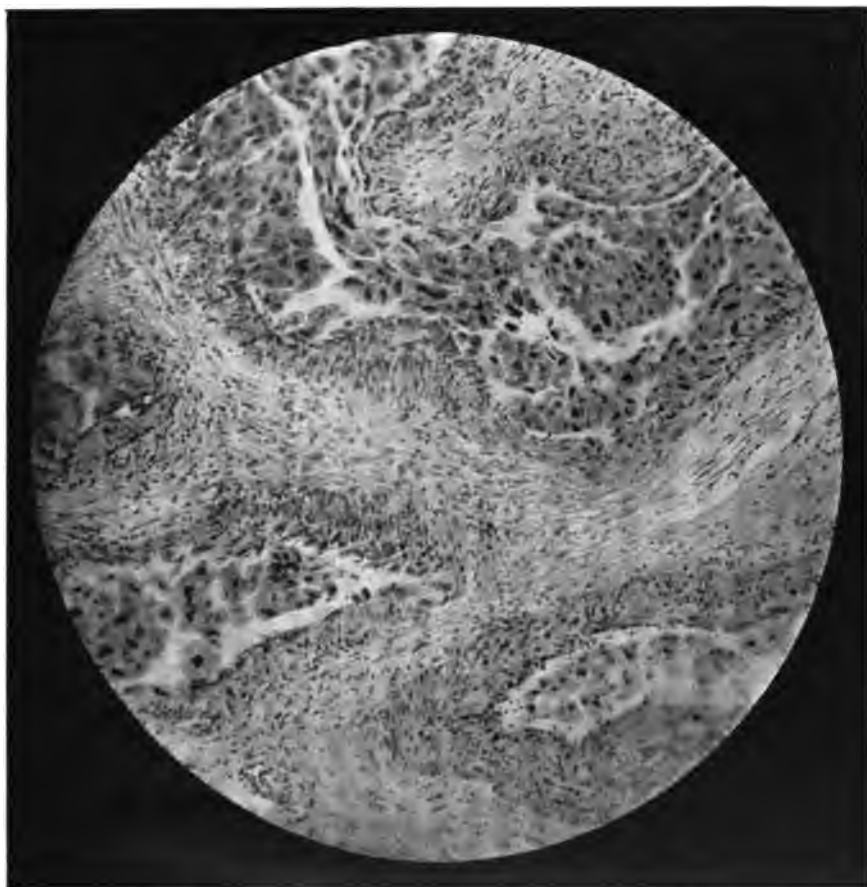


FIG. 2.—Microphotograph of the uterine wall—low power.



FIG. 3.—Microphotograph of the uterine wall—high power.

thickest, shows a condition which is not easy to explain. Many of the arteries, both large and small, are filled with large cells which completely occlude the lumina. Some of these cells contain a large lobulated nucleus, others contain multiple nuclei (6 to 12 or more in number). In some of the vessels the cells lie free within the lumen, but in others they are situated in part at least beneath the lining endothelium, and may even form a part of the inner wall of the vessel. The cytoplasm of these large cells is often vacuolated, suggesting the presence of fat droplets. The tissue surrounding most of these arteries appears perfectly normal. In one section an artery is thrombosed and contains both masses of fibrin and large cells like those described. In another section an artery is thrombosed but contains only fibrin. In both cases some organization of the fibrin has begun.

The inner edge of the sections, corresponding to the lumen of the uterus, shows numerous chorionic villi, some of which are embedded in blood clot and have undergone necrosis. In a few areas small masses of typical decidual cells are present. For the most part, however, the chorionic villi come in direct contact with the smooth muscle tissue, or with the walls of large veins. At the end of one villus the syncytial cells are turned back and the cells of the layer of Langerhans, greatly increased in number (trophoblasts of Minot?) have penetrated through the muscle tissue into a large vein and are streaming out into its lumen. In other places similar cells are extending from the ends of villi into the muscle tissue and spreading through it in rows and clumps in all directions, so that in places they suggest in consequence of their alveolar arrangement the picture of a carcinoma. In the thin parts of the uterine wall, these cells extend almost to the peritoneal surface.

The walls of many of the large veins contain large cells which closely resemble those found in the arteries, but it is only occasionally that any of these large cells are found free within the lumen of any one of them. Similar cells occur to some extent in the connective tissue and also in muscle tissue. On account of the presence of the masses of large cells in the arteries a diagnosis of malignancy was made and extirpation of the entire uterus advised. The description of the specimen received is as follows:

Specimen (S-05.937), consists of uterus with the oviduct and ovary on the right side, and the ovary on the left side. The left

oviduct has been removed. Along the upper border of the uterus is a sutured incised wound extending from a little beyond the middle point of the uterus out to the ovary. The right oviduct, ovary, and a portion of broad ligament with it are swollen and edematous. The left ovary and a small amount of tissue connected with it are likewise edematous. Both ovaries have a number of small cysts, especially the left. The uterus measures 10.5 cm. from the fundus to the cervix. Its greatest breadth is 7.5 cm. Its greatest thickness 3 cm. The sutured wound along the upper left border of the uterus already referred to is bulging in the lower part, and grayish tissue projects more or less from it. Cervix swollen, sutured. On opening up the uterus, the cervix is moderately dilated and filled with a soft reddish clot. The fundus contains a soft light reddish gray polypoid mass 4.3 cm. long, 1.3 cm. wide, from 3 to 5 mm. thick, which is attached to the upper end of the uterus. The uterine wall is grayish and rather opaque in color. On section through the incised portion of the fundus of the uterus there is found yellowish gray somewhat granular tissue through which the sutures are largely placed. This tissue is 7 mm. in depth and 12 mm. in width. Toward the middle line of the uterus this curious grayish tissue becomes 12 mm. in depth and 8 mm. in width. In the middle line of the fundus this tissue extends clear through the wall of the uterus, and the soft mass within the uterus is seen to be attached at its base to it. In the left ovary is a small corpus hemorrhagicum.

Microscopic examination of numerous sections through all parts of the uterus but especially in the region of the first operation failed to show any large cells corresponding to those found in the arteries in the first specimen. The reddish gray mass within the uterus consists of blood clot containing the remains of necrotic chorionic villi. Along the line of the suture there is considerable necrosis of muscle tissue; moderate evidences of repair.

Remarks.—There seem to be but two probable explanations of the appearance described in this case. One is that the rupture was due to (a) a malignant growth invading and weakening the uterine wall. The tumor might be metastatic from somewhere else in the body. Against this explanation is the fact that the cells within the arteries show no evidence of extension into the surrounding tissue. Or the tumor might be primary within the uterus, an atypical chorio-epithelioma. This was the view at first entertained. Against

this interpretation is the size of the cells within the arteries. They are much larger than the cells of the layer of Langerhans which have been described as extending into the uterine tissue from the ends of some of the villi. The cells within the arteries resemble more closely the decidual cells.

When all things are taken into consideration the more reasonable explanation seems to be that the rupture was due to (b) a cornual or interstitial pregnancy, and that the lesions present are due entirely to an increase of normal functions under abnormal conditions. On this theory the large cells in the walls of the veins, in the connective and muscle tissues, and within the arteries would represent new-formed decidual cells. A similar formation of decidual cells in the walls of veins is present to some extent in the mucous membrane in normal pregnancy. The penetration of villi into the muscle tissue is perfectly analogous to the normal process of growth into the uterine mucosa, but the extension of the cells of the layer of Langerhans into the adjoining tissues is probably in excess of the normal condition. It is only fair to say that embryologists who have studied the sections think that a tumor origin for the large cells in the arteries is a more reasonable explanation.

This case seems well worth publishing in spite of the fact that it is incomplete, owing to the lack of post-mortem examination, because it calls attention to the necessity of careful histologic study of cases of interstitial pregnancy. It is possible, also, that cases of tubal pregnancy might throw some light on the unusual lesions present in this case.

Pathology

A CONTRIBUTION TO THE STUDY OF EOSINOPHILIA*

BY CHARLES E. SIMON, M.D.

Of Baltimore, Maryland

REPORT OF A CASE OF TRICHINOSIS

To the list of trichinosis cases which have been reported already I can add a further case which in a way is a curiosity. The infection occurred in my own person and was discovered accidentally. I was studying the phagocytic activity of the leukocytes of an individual and was using my own blood as control. The specimens were merely stained with methylene blue and thus showed no granulations. To my astonishment I found that while the polynuclear elements of the experimental subject had taken up the organism under investigation in large numbers, my own leukocytes showed no phagocytic activity whatsoever. The examination of a properly stained specimen then showed that my eosinophilic leukocytes were enormously increased and that the polynuclear neutrophilic elements were for the most part devoid of granules. At the time I considered myself in good health, but had been confined to bed about a fortnight previously for two days with an attack of what I thought to be some sort of winter infection. There was general lassitude, anorexia and a great deal of epigastric pain of a peculiar sickening character which radiated to the right and left hypochondriac regions and to the back. I rather think that this attack marked the time of my primary muscle invasion. There were none of the classical symptoms of trichinosis, but for

* The first half of this study, comprising a review of the literature and a discussion of the diagnostic and other significance of eosinophilia in different diseased states, was published in the *International Clinics*, 15th Series, vol. iv, page 278.

a period of about two weeks fairly early in the attack and occasionally also since I have suffered quite severely from respiratory distress, in the latter part of the day especially, while the nights and morning hours have been practically free from discomfort. Rest in bed during part of the day has been the only method which has brought any relief. The dyspnea is associated with substernal oppression; there is no increased frequency of respiration and no cyanosis; it is entirely inspiratory in character and leads to frequent efforts to obtain a deep breath; from time to time great relief follows such an attempt, but usually only lasts for a short time, sometimes indeed only for a fraction of a minute. A successful yawn likewise brings comfort and this fact, therefore, also leads to frequent efforts in this direction. When the yawn or deep breath "does not go through" the distress frequently becomes quite unbearable. Exercise, much talking, and similar efforts aggravate the condition. While I am up and about, the position at the microscope, leaning slightly forward, is perhaps the most comfortable. There has been no lung involvement whatever and no expectoration.

The muscle symptoms have been comparatively trivial and would ordinarily have been regarded as rheumatic in character. During the ten days preceding the discovery of the condition there has occasionally been a little diarrhea, apparently without cause.

A direct examination of the muscle tissue was not practical and seemed unnecessary, as all other causes leading to eosinophilia could readily be eliminated. Examination of the stools for parasites and their eggs has been entirely negative. The hypereosinophilia which was discovered on March 2, 1905, persisted for practically three months (see table, page 172). Infection was probably acquired through handling trichinous muscle obtained at an autopsy.

My object in reporting my own case is (1) to show how readily certain grades of trichinous infection can be overlooked in the absence of a blood examination; (2) to draw attention to the peculiar character of the dyspnea which has not been described before, mention being made only of the possibility of its occurrence without any reference to its character; (3) to note certain peculiar blood changes which likewise have not been previously described. The most remarkable deviation from the normal was the occurrence

of neutrophilic leukocytes, devoid of any granules or carrying only a very small number (see Fig. 1). This condition was noted on the day when the hypereosinophilia was first observed, and was most marked for two or three days, after which the cells were again perfectly normal in appearance. On one or two occasions since, such non-granular polynuclear cells have again appeared, but were present only in relatively small numbers. I am not aware that a similar observation has been made in the other cases of trichinosis which have been reported. Possibly the same thing has been seen, but was referred to some defect of technic, as I also was inclined to do. But I could readily convince myself that the defect actually existed in the cells and not in the method of staining, as control specimens from other individuals gave perfectly normal results. In itself this finding is perhaps not so remarkable as would appear on first consideration, as a deficiency in granules is not so very rare under pathologic conditions, although it has attracted comparatively little attention. Ewing¹⁵⁴ states that a diminution in the number of neutrophilic granules is commonly observed in acute leukocytosis, and that this abnormality may progress until very few granules are left. I have seen this myself in severe septic conditions in several cases of malignant disease, and as Ewing and Arneth¹⁵⁵ have noted, in the late stages of chronic myelogenous leukemia, in which the cells may indeed become entirely devoid of neutrophilic material. Changes in the nuclei of my own cells, however, which could suggest cellular destruction could not be demonstrated. There was no evidence of fragmentation, or of hydropic changes, nor tendency toward an undue degree of pyknosis. The phenomenon in the present instance seems to me particularly significant, as, in association with the large number of eosinophiles, it seems to preclude altogether the possibility of a transformation of neutrophilic into eosinophilic elements, a view which is even now maintained by some. In not a single one of the polynuclear non-granular or but slightly granular (neutrophilic) cells could I find the least suggestion of the formation of eosinophilic granules, and surely, if such a transformation did occur in the circulating blood, there should have been extraordinary chances of observing

¹⁵⁴ Clinical Pathology of the Blood, 2d ed.

¹⁵⁵ Deutsch. Arch. f. klin. Med., vol. lxxix.

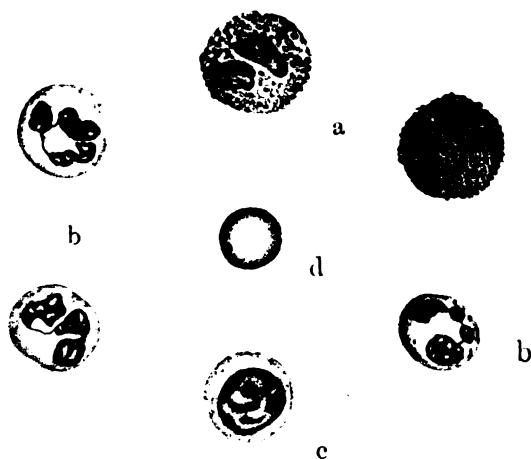


FIG. 1.—Cells from a case of trichinosis. *a*, Eosinophiles showing the vesicular character of the granules; *b*, neutrophiles devoid of granules; *c*, anomalous mononuclear cell; and *d*, red cell to show the differences in size between the red and the white cells.

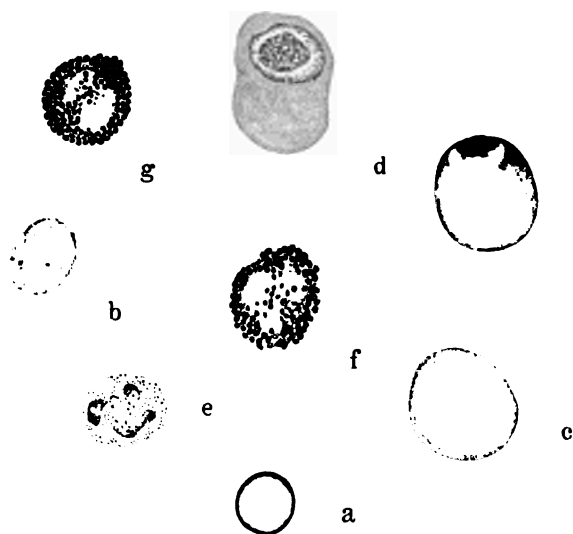


FIG. 2.—The leukocytes of the guinea pig. *a*, *b*, *c*, small and large mononuclear elements; *d*, vacuolated mononuclear cells; *e*, polynuclear amphophile; *f*, eosinophile; and *g*, mast cell.

the transition in the present instance. The contrast between the comparatively small non-granular neutrophiles and the large, very coarsely granular eosinophiles was indeed most striking (note the vesicular character of the granules in Fig. 1).

To account for the absence of neutrophilic material one might, of course, imagine that as a result of excessive functional activity the secretory power of the cells had been exhausted. But the simultaneous numerical reduction of the absolute values of the neutrophiles rather suggested to my mind that the material which is normally utilized in the construction of the neutrophilic granulation had in this instance been consumed in the construction of the eosinophilic granulation. I would suggest that it would be well in the observation of future cases of trichinosis to pay especial attention to this point rather early in the course of the infection, for it is quite possible that the anomaly only occurs at that time, and that the bone marrow soon adjusts itself to existing conditions. As I have already said, such imperfect neutrophiles were only found to any extent during the first few days, when the eosinophilic values were especially high.

I have mentioned before that the discovery of my hypereosinophilia was made accidentally while I was engaged in the study of the phagocytic activity of the leukocytes. The opportunity seemed unusually good to ascertain to what extent, if at all, the eosinophiles will play the rôle of bacterial phagocytes. To this end I studied the behavior of my blood to the various staphylococci, the streptococcus pyogenes, the bacillus pyocyaneus, the colon and typhoid bacillus, according to the method suggested by Leishman.¹⁵⁶ The result was invariably negative. Unfortunately I did not make any experiments in this direction at the time when non-granular neutrophiles were present, with the exception of the single examination with the pyocyaneus bacillus; at that time I could detect no polynuclear elements of any kind containing bacilli. To draw the inference that in the absence of the specific granulation the polynuclear neutrophilic elements are incapable of phagocytosis appears tempting, but under the circumstances of course not justifiable.

As a casual observation which was further made I may mention

¹⁵⁶ Brit. Med. Journ., 1902, Jan. 11.

the occurrence, especially during the first fortnight, but at times also since then, of immense numbers of plaques. The increase of these frequently exceeded anything that I have ever seen. The only other observer who mentions the plaques in trichinosis seems to be Schleip (*loc. cit.*). He notes that with the disappearance of the acute symptoms the blood plaques are markedly increased, and that during convalescence the blood actually seems swarming with them. As he could find no evidence of degeneration of the red cells he concludes that the plaques could not have been of erythrocytic origin, and he inclines to the view that they represent disintegration products of the eosinophilic cells. He mentions that he met with one fairly large plaque which contained four undoubted eosinophilic granules. I have seen several such formations in my blood also, which manifestly represented bits of eosinophilic cells, but I am scarcely prepared to look upon the innumerable plaques as products of leukocytorrhexis. However, I have no other explanation to offer. Although my red cells have been reduced to 3,050,000, I also do not think that the increase of the plaques was referable to the destruction of these elements.

So far as the small mononuclear non-granular leukocytes are concerned I could also ascertain that during convalescence there is not only a relative but also an absolute increase. Among these mononuclear elements cells appear, especially numerous early in the infection, which showed rather peculiar staining properties. They are pictured in Fig. 1. They are entered in the counts to some extent under the small mononuclears and partly among the large mononuclears, although their staining properties and other morphologic characteristics do not, strictly speaking, warrant their classification as such. Possibly they represent young cells.

Schleip states in his paper that while he has seen no transition forms whatever between neutrophilic and eosinophilic cells, he has met with basophiles (mast cells) containing eosinophilic granules. He cites Hirschfeld¹⁵⁷ and Pappenheim¹⁵⁸ as advocating the view that the basophiles result from the eosinophiles. I must confess that working with the eosinate of methylene blue I have never seen a single mast cell either in my own blood or in any blood which

¹⁵⁷ Virchow's Arch., vol. cliv.

¹⁵⁸ Ibid., vol. cliii, and Zeit. f. klin. Med., vol. xlvii.

suggested the least relation to an eosinophile. Schleip, however, has used Leishman's stain, and I can thus readily understand his difficulties. Where such an important point is to be elicited Leishman's method is not applicable; in studies which have to do with the neutrophilic or the eosinophilic granulation it is far inferior to the eosinate of methylene blue. If Schleip really believes that he saw basophiles with eosinophilic granulations, he should certainly have investigated the question by methods which are especially well adapted for the recognition of the eosinophilic granulation. In his citation of Pappenheim and Hirschfeld, moreover, he is mistaken, for both investigators have always insisted upon the development of the eosinophilic leukocytes from basophilic non-granular mononuclear leukocytes by way of the eosinophilic myelocyte.

The numerical changes in the number of the various leukocytes which have taken place in my blood since the discovery of the infection up to the present date are shown on pages 172 and 173.

A STUDY OF THE OCCURRENCE OF HYPOEOSINOPHILIA IN SEPTIC INFECTIONS

The brief survey of the literature dealing with the numerical variations of the eosinophiles in disease, as outlined in the historical summary, brings out the fact that such variations may be of distinct diagnostic value. It is manifest, however, that the various writers upon the subject have been impressed rather more with the occurrence of hypereosinophilia than of hypoeosinophilia. The latter condition indeed has attracted but little attention. This is the more remarkable since Ehrlich¹⁵⁹ has noted the fact that in the common types of hyperleukocytosis the eosinophiles do not take part in the increase, and various writers have since remarked that under such conditions the eosinophiles are frequently diminished, or may be altogether absent. During the past five years I have become more and more impressed with the significance of this decrease of the eosinophiles, and have been forced to the conclusion that in this decrease, when associated with an increase of the polynuclear neutrophilic elements, we have one of the most subtle means of diagnosing certain bacterial infections. Writers

¹⁵⁹ Deutsch. Naturforsch. Versamml., Breslau, 1904.

**CURVE OF NEUTROPHILES AND EOSINOPHILES IN CASE OF
TRICHINOSIS.**

Date.	Absolute leukocyte count.	Per cent. of small mononuclears.	Per cent. of large mononuclears.	Per cent. of polynuclear neutrophiles.	Per cent. of eosinophiles.	Per cent. of mast cells.	Absolute mononuclears per cubic millimeter (small).	Absolute large mononuclears per cubic millimeter.	Absolute neutrophiles per cubic millimeter.	Absolute eosinophiles per cubic millimeter.	Absolute mast cells per cubic millimeter.
March 2	....	20.0	12.1	17.1	50.7	0.0	....	....	....	....	...
March 3	....	...	....	....	....	..	....	....	....	....	...
March 4	10,500	21.0	10.7	29.9	37.8	0.4	2205	1128	3150	3969	42
March 5	10,500	28.0	6.0	25.5	40.5	0.0	2940	680	2677	4252	0
March 6	11,000	23.5	3.5	30.0	42.5	0.5	2585	385	3300	4675	55
March 7	9,500	24.0	9.6	31.5	34.4	0.7	2280	912	2992	3268	66
March 8	6,925	36.0	4.4	21.6	37.8	0.9	2491	304	1494	2581	62
March 9	8,500	30.5	7.0	29.8	33.0	0.0	2592	595	2490	2805	0
March 10	....	28.6	9.1	31.7	30.4	0.0	....	....	....	....	...
March 11	5,750	36.5	3.2	27.6	32.1	0.4	2098	184	1587	1845	22
March 12	6,500	25.6	8.4	35.6	29.6	0.8	1664	546	2314	1924	52
March 13	7,000	26.5	7.2	42.5	23.6	0.4	1855	504	2975	1652	28
March 14	6,500	25.1	3.6	40.9	25.5	0.8	1631	234	2658	1657	52
March 15	7,750	34.2	4.2	33.4	25.3	0.3	2650	325	2588	1960	23
March 16	6,000	33.8	8.1	23.7	33.4	0.7	2028	486	1422	2004	42
March 17	6,750	24.2	8.1	33.8	32.4	0.9	1638	546	2281	2187	60
March 18	7,250	36.5	8.1	27.7	27.2	0.2	2646	587	2008	1972	14
March 19	11,250	32.9	5.8	36.9	22.3	1.8	3701	652	4151	2508	202
March 20	7,000	36.4	8.9	29.9	24.0	0.6	2548	623	2093	1680	42
March 21	7,500	32.6	8.6	32.3	25.7	0.5	2445	625	2422	1927	87
March 22	6,250	39.3	8.6	30.6	20.0	1.3	2456	537	1912	1250	81
March 23	7,750	39.1	2.9	37.3	20.5	0.0	3030	224	2890	1588	0
March 24	7,500	42.6	3.6	33.6	18.3	1.6	3195	270	2520	1372	120
March 25	8,750	42.3	4.9	31.9	19.2	1.1	3699	428	2791	1680	96
March 26	7,500	41.6	3.6	39.0	14.3	1.3	3120	270	2925	1072	97
March 27	9,750	32.4	10.7	46.1	10.7	0.9	3159	1043	4494	1043	87
March 28	5,750	35.6	2.3	46.3	15.3	0.3	2047	132	2662	879	17
March 29	7,000	36.0	6.3	41.6	14.6	1.0	2520	441	2912	1022	70
March 30	5,000	36.3	6.3	39.3	17.6	0.3	1815	315	1665	880	15
March 31	7,750	32.6	2.6	48.3	16.0	0.3	2526	201	3743	1240	23
April 1	7,750	26.7	5.9	49.7	17.3	0.3	2069	457	3851	1340	28
April 2	7,500	33.6	7.6	43.3	16.0	0.0	2520	570	3247	1200	0
April 3	5,500	40.4	6.7	34.9	16.8	0.9	2222	368	1919	924	50
April 4	9,250	30.5	10.1	43.3	15.3	0.5	2821	934	4005	1415	46
April 5	7,250	37.2	2.7	45.7	13.5	1.0	2697	195	3313	978	72
April 6	5,750	38.6	5.3	38.6	16.3	1.0	2219	304	2219	937	57
April 7	7,500	31.5	11.2	42.4	14.4	0.2	2362	340	3180	1080	15
April 8	8,750	32.8	3.7	49.5	12.9	0.9	2870	323	4331	1128	78
April 9	7,750	33.1	15.0	36.5	15.0	0.3	2565	1162	2828	1162	23
April 10	5,600	44.5	8.0	38.3	11.6	0.6	2492	448	2144	580	33
April 11	6,250	42.3	2.3	41.6	13.3	0.3	2643	143	2600	831	18
April 12	5,000	42.3	7.0	35.3	18.0	0.0	2115	350	1765	900	0
April 13	5,750	35.3	11.3	40.0	13.0	0.3	2029	649	2300	747	17
April 14	7,500	35.6	11.3	41.6	11.0	0.3	2670	847	3120	825	22
April 15	6,750	39.0	9.0	39.6	10.6	1.6	2288	607	2673	1075	108
April 16	5,000	41.0	8.0	42.5	14.0	2.0	2050	150	2125	700	100
April 17	9,250	36.6	6.6	42.6	13.0	1.0	3385	610	3940	1202	92
April 18	8,750	38.6	6.6	45.0	8.6	1.0	3377	577	3937	752	87
April 19	8,000	37.0	9.6	39.0	14.3	0.3	2960	768	3120	1134	24

CURVE OF NEUTROPHILES AND EOSINOPHILES IN CASE OF TRICHINOSIS.

Date.	Absolute leukocyte count.	Per cent. of small mononuclears.	Per cent. of large mononuclears.	Per cent. of Polymuclear neutrophils.	Per cent. of eosinophiles.	Per cent. of mast cells.	Absolute mononuclears per cubic millimeter (small).	Absolute large mononuclears per cubic millimeter.	Absolute neutrophils per cubic millimeter.	Absolute eosinophiles per cubic millimeter.	Absolute mast cells per cubic millimeter.
April 20	7,250	33.6	8.3	41.6	14.6	1.6	2436	601	3016	1058	116
April 21	.....	48.0	10.0	30.0	11.7	2.0	.....	.....	.....	.....	.....
April 22	7,250	37.6	9.0	41.6	11.0	0.6	2718	652	3016	797	43
April 23	6,250	43.6	5.6	39.2	10.9	0.4	2725	360	2450	681	25
April 24	6,250	34.6	5.6	50.0	9.6	0.6	.....	.....	.....	600	.....
April 25	6,750	28.0	11.2	46.9	13.1	0.6	.....	.....	.....	884	.....
April 26	7,250	41.3	8.0	39.3	9.6	1.6	.....	.....	.....	696	.....
April 27	4,750	39.3	2.3	49.0	9.0	0.3	.....	.....	.....	427	.....
April 28	8,500	41.6	4.3	42.6	10.0	1.3	.....	.....	.....	850	.....
April 29	6,250	41.0	9.6	41.0	8.6	1.3	.....	.....	.....	537	.....
April 30	10,750	41.3	8.0	41.0	9.3	0.3	.....	.....	.....	999	.....
May 1	5,250	26.0	13.0	44.4	11.6	1.3	.....	.....	.....	609	.....
May 2	6,000	25.6	17.0	47.6	9.6	0.3	.....	.....	.....	576	.....
May 3	5,500	36.6	3.3	49.6	9.6	0.6	.....	.....	.....	528	.....
May 4	8,250	43.1	9.0	36.2	10.3	1.2	.....	.....	.....	849	.....
May 5	5,750	36.0	4.6	49.6	9.0	0.6	.....	.....	.....	517	.....
May 6	7,750	38.6	4.0	46.6	9.6	1.0	.....	.....	.....	744	.....
May 7	10,000	48.3	4.3	37.6	8.0	1.6	.....	.....	.....	800	.....
May 8	4,000	39.0	5.3	49.3	6.0	0.3	.....	.....	.....	240	.....
May 9	7,500	45.0	4.0	40.3	10.0	1.3	.....	.....	.....	750	.....
May 10	6,750	41.6	7.3	40.3	10.6	.....	.....	.....	.....	715	.....
May 11	5,750	36.3	4.3	50.6	7.6	1.0	.....	.....	.....	437	.....
May 12	10,500	41.3	2.0	48.3	7.6	0.6	.....	.....	.....	798	.....
May 13	9,500	45.6	7.3	39.0	7.0	1.0	.....	.....	.....	665	.....
May 14	7,000	35.5	2.5	53.3	8.2	0.3	.....	.....	.....	574	.....
May 15	6,500	42.0	3.0	47.6	6.6	0.6	.....	.....	.....	429	.....
May 16	6,000	42.3	3.3	45.6	8.3	1.3	.....	.....	.....	498	.....
May 17	5,500	43.3	2.3	41.0	12.0	1.3	.....	.....	.....	660	.....
May 18	8,500	41.0	3.6	49.0	5.6	0.0	.....	.....	.....	476	.....
May 19	5,750	41.9	6.9	42.6	7.4	1.5	.....	.....	.....	425	.....
May 20	9,500	31.3	5.2	56.0	6.2	1.2	.....	.....	.....	589	.....
May 21	9,000	34.5	8.8	47.6	8.1	1.1	.....	.....	.....	729	.....
May 22	7,750	34.7	5.0	53.7	6.0	1.5	.....	.....	.....	465	.....
May 23	8,750	34.3	7.3	52.6	5.6	0.0	.....	.....	.....	490	.....
May 24	8,500	35.3	9.0	39.6	13.3	2.0	.....	.....	.....	1130	.....
May 25	7,800	30.3	8.6	55.3	5.6	0.6	.....	.....	.....	436	.....
May 26	6,500	39.0	6.3	46.0	8.0	0.7	.....	.....	.....	520	.....
May 27	10,750	43.3	4.0	46.0	8.3	1.0	.....	.....	.....	888	.....
May 28	9,500	40.6	3.6	49.3	6.3	0.0	.....	.....	.....	598	.....
May 29	4,000	50.0	3.6	38.0	8.3	0.3	.....	.....	.....	332	.....
May 30	10,000	39.6	3.3	50.0	6.3	0.3	.....	.....	.....	630	.....
May 31	5,750	47.3	6.3	43.6	5.6	0.3	.....	.....	.....	322	.....
June 1	8,250	41.6	6.3	45.0	6.6	0.6	.....	.....	.....	544	.....
June 2	5,750	35.6	7.3	52.3	5.0	1.0	.....	.....	.....	287	.....
June 3	5,000	41.6	5.6	44.0	7.3	1.3	.....	.....	.....	365	.....
July 17	.....	47.3	5.3	42.0	4.6	0.3	.....	.....	.....	.....	.....
Oct. 25	.....	38.0	6.5	52.0	3.0	0.5	.....	.....	.....	.....	.....

have within recent years repeatedly dwelt upon the signal value of the differential leukocyte count in septic infections, and have pointed out the undoubted fact that in many instances in which the absolute leukocyte count has given no indication of the existence of such infection the increase of the neutrophilic elements has indicated the true state of affairs. In these communications, however, nothing is said of the behavior of the eosinophiles; on the contrary, the polynuclear elements in general, irrespective of the character of the granulation, have usually been contrasted with the mononuclear forms. In this manner, I think, the most important point in the diagnosis of septic conditions has been overlooked, viz., the increase of the polynuclear neutrophiles associated with the decrease, or indeed the entire absence of the eosinophiles. For this interrelation between the two essential types of granulocytes I would suggest the term "septic factor." Its constancy is seen by a survey of the accompanying tables in which I have collected 40 cases taken at random. As normal values I have taken 74 per cent. as maximal for the polynuclear neutrophiles and 1 per cent. as minimal value for the eosinophiles. To enter upon clinical details at this place, or upon difficulties in diagnosis does not seem necessary, as my paper is essentially intended to develop the fact and to serve as a contribution to the study of eosinophilia.

	Percentage of Polynuclear neutrophiles	Eosino- philes
Appendicitis	84.5	0.2
" "	76.6	0.1
" "	87.1	0.0
" "	86.1	0.0
" "	89.1	0.1
" "	92.0	0.0
" "	86.0	0.0
" "	78.0	0.0
" "	91.1	0.0
" "	88.0	0.0
" "	93.6	0.0
" "	80.0	0.0
" "	86.1	0.0
" "	96.1	0.0
" "	84.1	0.2
" "	81.8	0.2
" "	97.4	0.0
" "	99.0	0.0

	Percentage of Polynuclear neutrophils	Eosino- philes
Appendicitis	78.0	0.2
“ “	84.0	0.2
Pneumonia	95.5	0.0
“ “	79.0	0.0
“ “ delayed resolution	79.0	0.0
“ “ (2d day)	91.6	0.0
“ “ (2d day)	91.5	0.0
“ “ (1st day)	87.1	0.0
“ “ (8th day)	84.8	0.0
“ “	90.7	0.0
“ “ (5th day)	94.0	0.0
Empyema	74.0	0.4
“ “ following pneumonia	92.4	0.0
Lumbar abscess	87.5	0.0
Perineal abscess	77.0	0.0
Large pelvic abscess	92.5	0.1
Perisplenic abscess	92.2	0.0
Pulmonary tuberculosis (3d stage)	75.9	0.4
Carcinoma of kidney with necrotic focus	86.5	0.3
Double pyosalpinx	76.9	0.3
Peritonitis (Perforative; obstruction of cecum)	78.4	0.0
Sloughing carcinoma of cervix	83.5	0.0

The following experiments were undertaken to gain an insight into the chemical mechanism underlying the production of the septic factor. As experimental animal the guinea pig was selected for reasons of convenience. It was ascertained very early, however, that not every animal could be used for our purposes, as the results were materially influenced by deviations from what may be regarded as the normal standard for the guinea pig. This standard is unfortunately not the average standard among animals which are obtained from dealers. Kuroff,¹⁶⁰ to whom we owe the first detailed examination of the blood of the guinea pig, gives 40 to 50 per cent. as normal value for the amphophilic polynuclear elements, and 1 per cent. for the eosinophiles. Kanthack and Hardy¹⁶¹ give 2 to 3 per cent. as normal eosinophile values. Opie states that in his animals the proportion rarely exceeded 2 per cent., when their weight was less than 500 grams, but that in animals of higher weight the average was much higher. Opie is inclined to bring the number into correlation with the state of

¹⁶⁰ Cited by Ehrlich, *Die Anämie*.

¹⁶¹ *Journ. of Physiol.*, vol. xvii.

nutrition of the individual animal. However this may be, so much is certain that it is not uncommon to meet with well-nourished animals which present an unusually high eosinophile count, while on the other hand it is likewise not uncommon to find extraordinarily low counts. I have had animals weighing more than 500 grams and apparently in good health which showed scarcely any eosinophiles at all, while others, weighing but little more, had 40 per cent. of eosinophiles. Examination of the feces in the latter case showed no evidence of the presence of metazoic parasites. Opie was unable to establish a relation between the presence of those protozoan parasites which are commonly found in the intestinal canal of guinea pigs and the occurrence in the blood of eosinophiles in unusually large numbers. I am inclined, however, to think that such a relation must nevertheless exist, for one can readily observe that the eosinophiles of an animal which have heretofore been present only in very small numbers increase very materially when kept in the same cage with one containing unusually large numbers. I did not feel justified accordingly in using such animals with abnormally high eosinophile counts in the investigation of the special points which were at issue, whenever this could be avoided. All those animals also were omitted which showed an unusually high amphophile count. In order to eliminate any possible effect of pregnancy and parturition male animals only were used. All were in good health and were well fed; no animal weighing less than 450 grams was used.

The blood specimens were always taken from the ear and prepared daily at the same hour unless specifically indicated otherwise. In the majority of observations total leukocyte counts were made besides the routine dry smears. The latter were stained with the eosinate of methylene blue which for ordinary work is much to be preferred to any of the various modifications of the Romanowsky dye. The various elements of the blood are in this manner well differentiated (see Fig. 2), and there is never the least difficulty of distinguishing between amphophiles and eosinophiles.*

An incidental observation which was made in the course of the examinations and which has not been described before may here be

* I am much indebted to Dr. E. Knorr for his assistance in connection with many of the blood-counts.

mentioned, that is, the occasional presence in the blood of fairly numerous red cells, presenting the so-called punctate or granular degeneration. Their appearance and disappearance did not seem to be connected with any unusual condition of the animal, and could not be accounted for. I have seen a similar condition on one occasion in a Canadian porcupine, the blood of which contained large numbers of embryonic filariæ, and I then looked upon the phenomenon as evidence of an anemizing process; particularly as nucleated red cells could also be demonstrated here and there in the smears. The same was found in some of the guinea pigs; but I have learned from experience that such occurrences are not at all rare in animals which present no evidence of disease. The observation is of interest, as Grawitz,¹⁶² in experimenting on the causation of the granular degeneration observed in the tropics (Plehn's malarial spores), exposed mice to high temperatures, and could then note the occurrence of granule cells. He concluded that the phenomenon in the non-acclimated Europeans was probably referable to the heat. In view of my findings the basis for his conclusions does not appear altogether satisfactory.

All inoculations were made intraperitoneally under aseptic precautions.

For purposes of convenience all the experimental work was carried on with *Bacillus pyocyaneus*, as this organism produces an acute infection in guinea pigs from which the animal is capable of recovering. Its action upon the animal is comparable directly to the action of the common pus organisms upon the body of man. This, however, is not brought out so well by the use of full-virulent cultures as with attenuated cultures. Otherwise the action is very apt to be too brisk, death occurring with great rapidity, especially when cultures are used which are several days old; on the other hand, the effect may be too mild if very small amounts are injected. The effect, however, is essentially the same in all cases; in every instance the septic factor is well pronounced (see Figs. 3 and 4).

In order to gain an insight into the chemical mechanism underlying the septic factor it seemed necessary first of all to ascertain

¹⁶² Berlin. klin. Woch., 1900.

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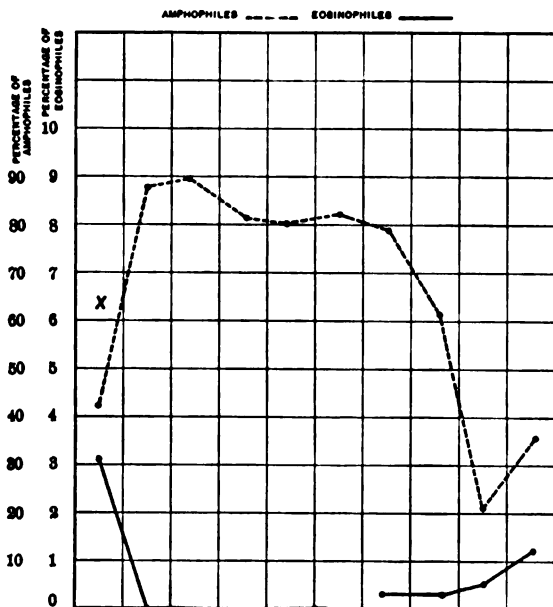


FIG. 3.—Reaction after injection of 5 c.c. of a bouillon culture of *Bacillus pyocaneus* attenuated by heat.

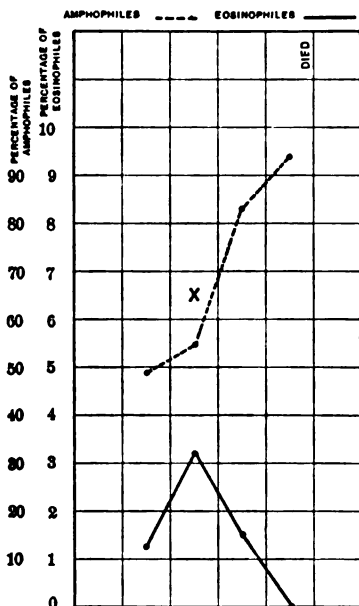


FIG. 4.—Reaction following the injection of 0.5 c.c. of a virulent culture, 24 hours old.

whether the same results could be reached with dead cultures grown in the test-tube on the common media, in other words, to determine whether the factor or factors which might be operative were present in these cultures at all; for it seemed quite conceivable that the effect might be referable to a specific action of the organism upon the tissues of the infected animal. To this end an animal was inoculated with 5 c.c. of a bouillon culture of *Bacillus pyocyaneus*, incubated for 24 hours at 37° to 40° C., and then pasteurized at a temperature of 60° to 65° C. This method was used in order to interfere as little as possible with the chemical integrity of the various substances produced either directly or indirectly during the growth of the organism. The result is seen in Fig. 5 and proves that the living organism is not necessary to produce the septic factor, and that the test-tube experiment is applicable for the elucidation of the subject under consideration.

It was next ascertained that the same result could be reached by working with cultures which had been killed off by steam; this is shown in Fig. 6.

An experiment with a one month old culture led to the same result (Fig 7).

In this manner volatile products as well as the direct action of the peculiar proteolytic ferment of *Bacillus pyocyaneus*—the pyocyanase—could be eliminated.

In order to determine to what extent soluble products in the culture might be responsible for the result a 24 hour culture in bouillon was passed through a Chamberland filter, and the filtrate boiled. Of this solution 5 c.c. was injected, and as shown in Fig. 8 the septic factor was again well pronounced.

With an older culture (one month old), as was anticipated, the increase of the polynuclear neutrophiles was greater and perfectly analogous to the result obtained in the simultaneous presence of the bodies of the dead bacteria (Fig. 9).

The question which now arose had reference to the chemical character of the component or components of the bacterial filtrate which might be responsible for the reaction. In consideration of the very small quantity of solids present in the cultures with which we had thus far been dealing, it did not seem advisable at this stage of the investigation to attempt the isolation of any

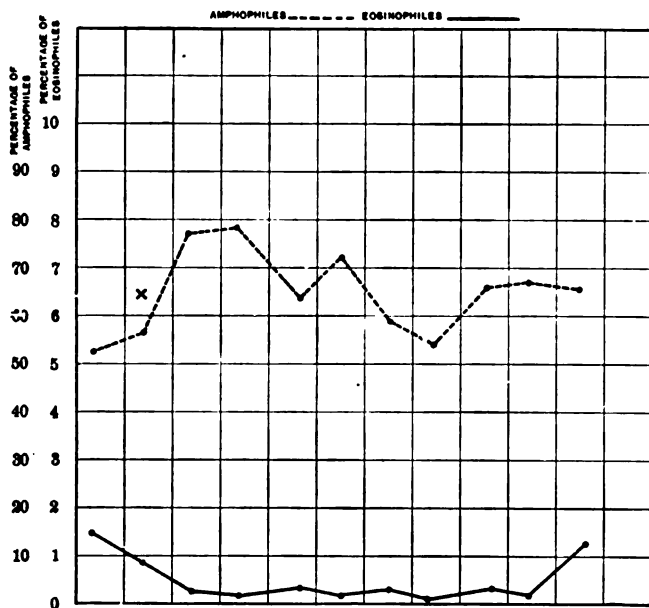


FIG. 5.—Reaction following the injection of 5 c. c. of a pasteurized 24 hour culture.

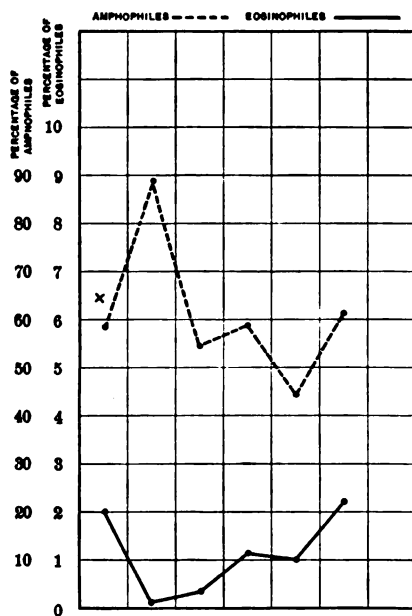


FIG. 6.—Reaction following the injection of 5 c. c. of a 24-hour-old culture, not filtered but killed off by steam.

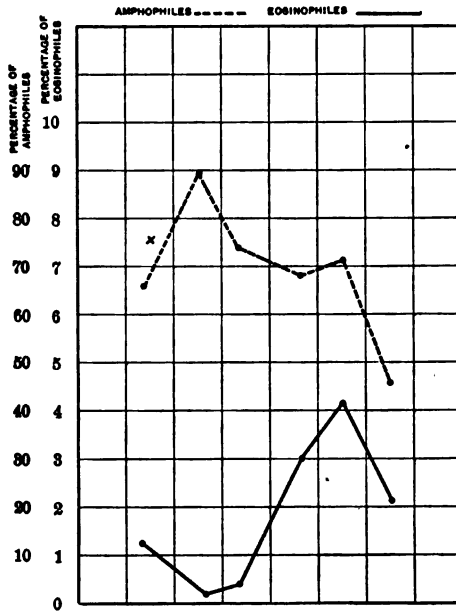


FIG. 7.—Same experiment as in Fig. 6, with a one-month-old culture.

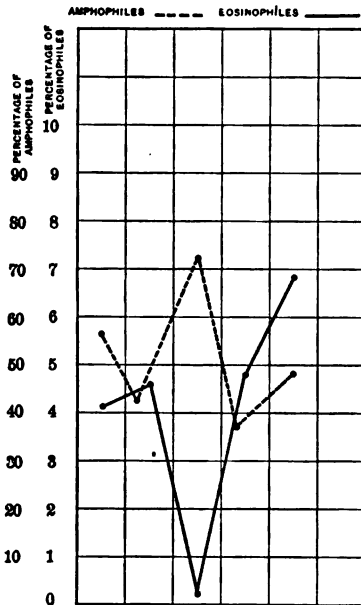


FIG. 8.—Reaction following an injection of 5 c.c. of a 24 hour culture, after filtration through a Chamberland filter.

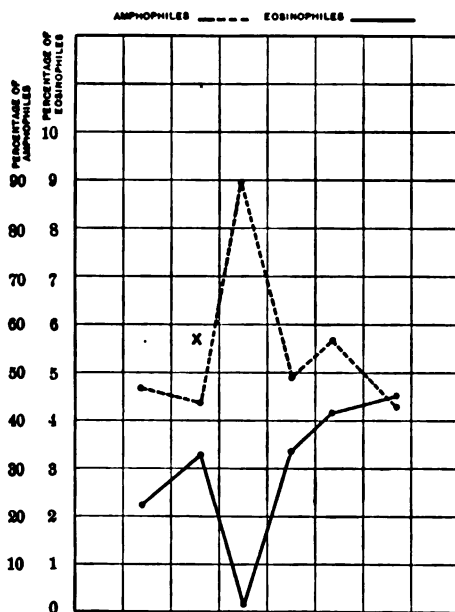


FIG. 9.—Reaction following the injection of 5 c.c. of a month old culture after filtration through a Chamberland filter.

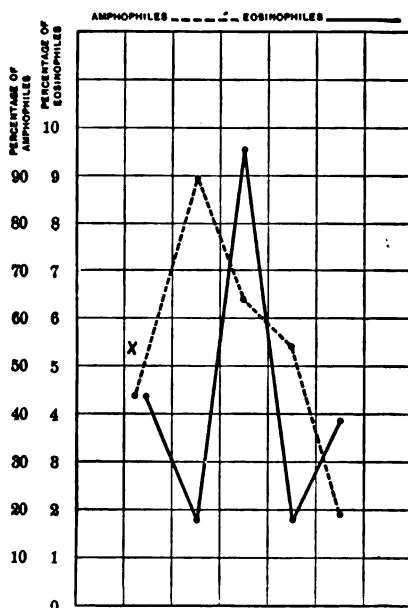


FIG. 10.—Reaction following the injection of 5 c.c. of a dialyzed bouillon culture.

specific components, but rather to obtain a general idea of the direction which future research would have to take. To this end it seemed advisable to determine whether the substance or substances which produce the septic factor could be removed from the cultures by dialysis. A preliminary experiment with a 24 hour bouillon culture, dialyzed for 48 hours and afterward boiled did not furnish an equivocal result (Fig. 10). The animal was quite ill for a number of hours. The total leukocyte count rose in 6 hours from 14,312 to 21,350, and the percentage of amphophiles from 42.9 to 89.3, while the eosinophiles fell from 4.4 to 1.7 per cent., which represents an actual diminution of the latter from 629 to 362 per cb.mm. This would suggest on first consideration that the process of dialysis had actually exercised a definite effect, as the eosinophiles had not even reached their lowest normal limit. The true explanation, however, is different, I think. It has been repeatedly observed in bacterial infections occurring in man, in which eosinophiles diminish or disappear during the active stage of the disease, that with the establishment of convalescence the cells not only return to normal, but even exceed this at times quite markedly (epicritic hypereosinophilia). Opie (*loc. cit.*) observed the same in his experiments on guinea pigs. As he says: "Such changes in the blood suggest that destruction of eosinophile cells has been followed by regeneration, causing an accumulation in excess of the normal." This observation, I think, explains the above result. The animal in question had been injected a number of times within a relatively short space of time, and as Fig. 11 shows, the recuperative reaction following each injection had become more and more marked, so that finally the eosinophiles rose to 19.7 per cent. (!), following the injection of simple sterile bouillon. This is a source of possible error in continued work on a given animal which should be borne in mind. The true septic reaction no doubt occurs, but is overshadowed already in a few hours by the inpouring of the eosinophiles from the bone marrow. In the experiment under consideration the absolute eosinophile value has thus risen to 1591 cells per cb.mm. 24 hours after the injection, as compared with 629 just before inoculation. Incidentally it may be mentioned that this recuperative reaction is generally followed by a fairly sudden drop within the next 24 hours and examination

of the blood then frequently shows extensive destruction of the cells in question.

With this interpretation of the above result in mind the examination was accordingly repeated in another animal, with this modification superadded, namely, that the dialyzed culture was passed through a Chamberland filter and thus freed from the bacteria. Unfortunately, as I thought, I was obliged to use an animal for this experiment with a high eosinophile count, and the result 6 hours later still left me in doubt whether the reaction was a true septic reaction. The next count, however, 24 hours after the injection cleared the situation entirely, and demonstrates the septic factor particularly well (Fig. 12).

As the solution in this case was free from bacteria, besides being dialyzed and thus freed from the dialyzable components formed by the bacteria, as well as those present in the Witte peptone, the idea suggested itself to investigate the action of simple dialyzed Dunham solution. If no reaction was obtained with this it was quite clear that the albumoses of our culture medium *per se* were without effect. Fig. 13 shows the result. Although the eosinophilic value was a trifle lower 6 hours after the injection than before, this animal had normally a low value; 24 hours later, moreover, the figure was higher than before.

Opie states that the injection of as much as 3 c.c. of sterile bouillon into the peritoneal cavity of the guinea pig causes no noteworthy change in the number of the eosinophiles. I have found this to be true also for our injections of 5 c.c.; there is, however, a marked increase of the polynuclear neutrophiles (Fig. 14). As this does not occur after the injection of the dialyzed Dunham solution the conclusion seems to be justifiable that the reaction in question is essentially referable to the dialyzable products of the Witte peptone, *i.e.*, to one or more of those components which, according to the old Kühpe nomenclature, were formerly conjointly designated as antipeptone. If this were true it should be possible to intensify the result by the injection of Dunham's solution which had been digested for a long time with trypsin (and subsequently passed through the Chamberland filter and boiled). To this end a product was used which had been digested for a week at 37° to 40° C. At the end of that time the original violet biuret reaction

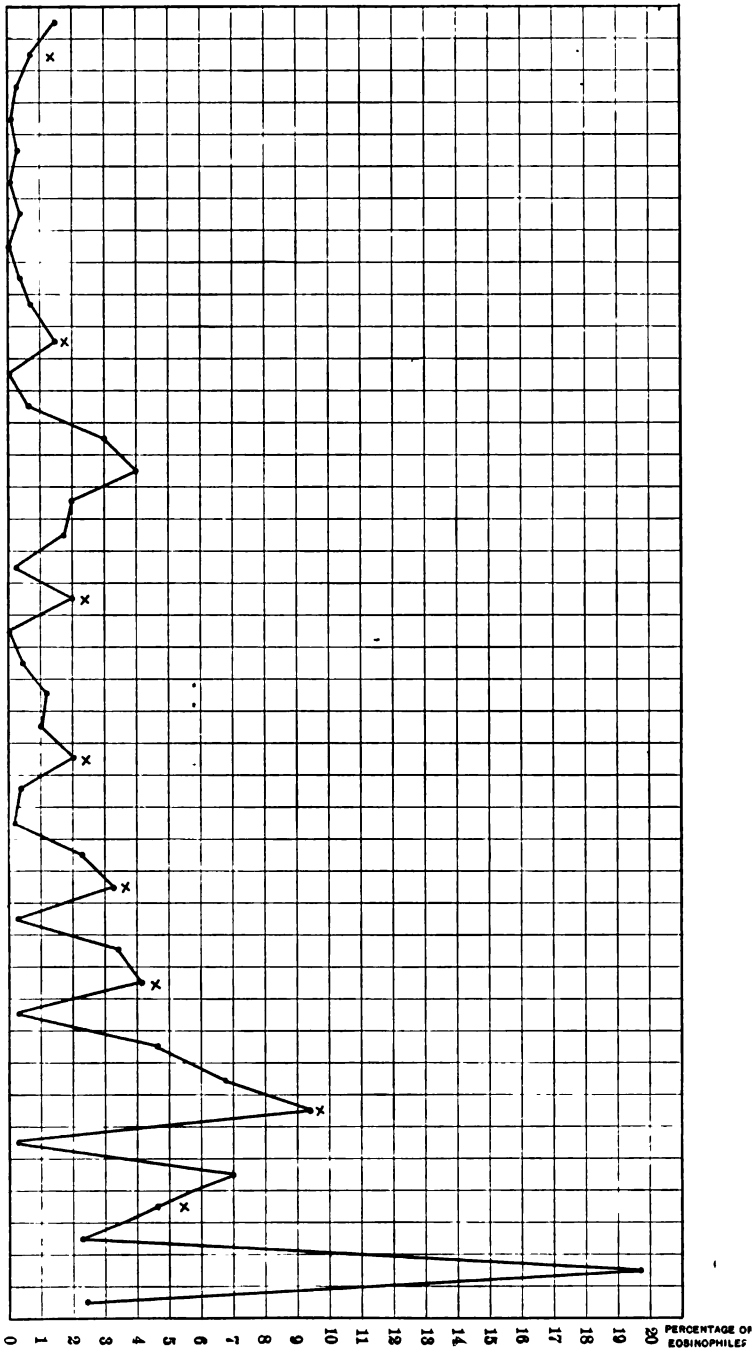


Fig. 11.—Eosinophile curve obtained from one animal in which repeated injections of bacteria and bacterial products have been made; note the gradually increasing reaction of the eosinophile.

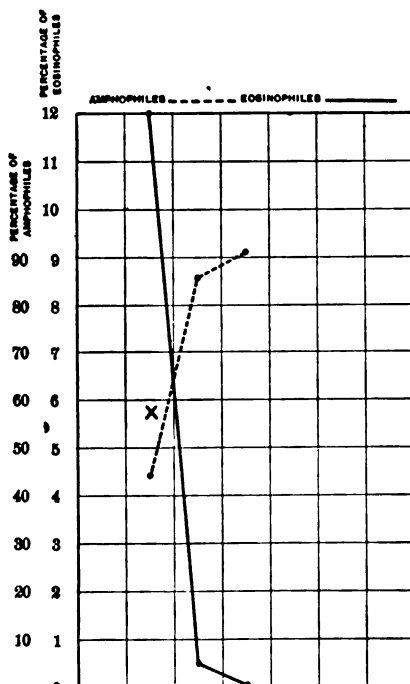


FIG. 12.—Note the intense reaction following the injection of 5 c. c. of a dialyzed Dunham culture, after passage through a Chamberland filter.

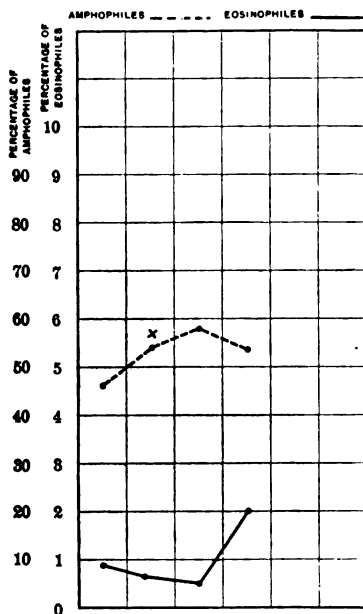


FIG. 13.—Note the absence of a reaction after the injection of a dialyzed Dunham solution

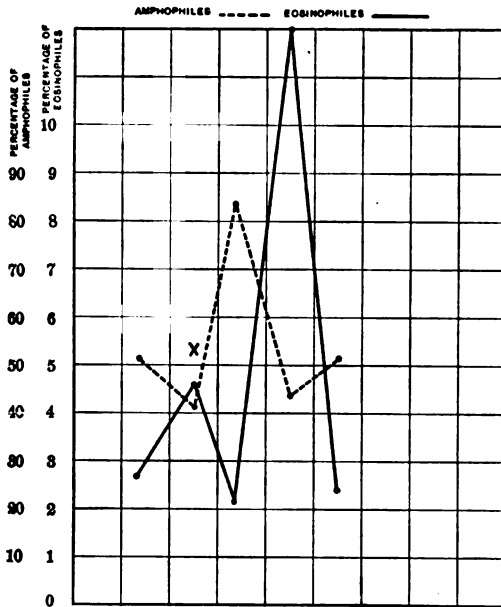


FIG. 14.—Reaction following the injection of simple bouillon; note that there is a drop of the eosinophiles, which, however, does not even reach a low normal value; the polynuclear increase is marked.

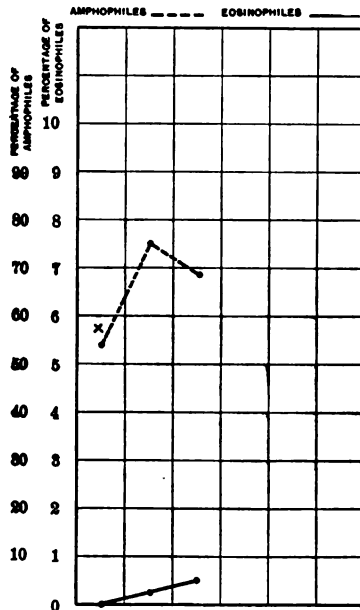


FIG. 15.—Reaction following injection of trypsin-digested Dunham solution; the eosinophiles preceding the injection were at zero and then began to rise; the rise of the amphophiles is indistinct.

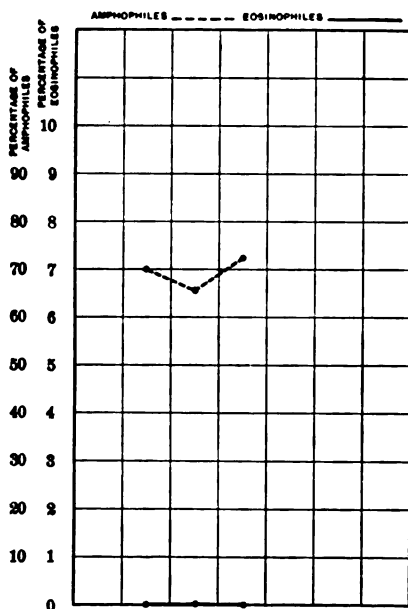


FIG. 16.—Reaction following the injection of the same solution as in experiment 13, but subequently dialyzed; there is no effect.

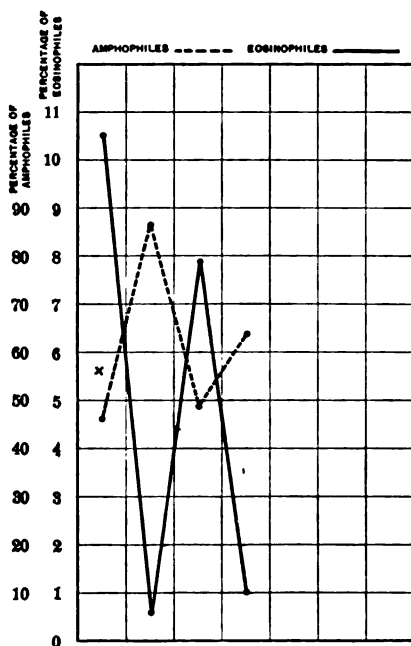


FIG. 17.—Reaction after injection of 5 c.c. of pepsin-digested culture after a passage through a Chamberland filter

had entirely disappeared and had been replaced by a purplish red, showing that the albumoses had probably been entirely transformed into "peptone" bodies. This result is seen in Fig. 15, which shows conclusively that these substances are capable of producing a marked grade of neutrophilic, that is, amphophilic hyperleukocytosis.

The counterpart to this experiment is seen in Fig. 16. In this case the animal had been injected with the same solution as in the foregoing experiment, but which had subsequently been dialyzed for three days.

To return to Experiment 10, it is seen that here the septic reaction could not be referable to dialyzable peptone bodies, nor to the bodies of bacteria, nor to albumoses. The only conclusion which is thus possible is the assumption that the reaction was referable either to metabolic waste products liberated by the bacteria, or to products of bacterial autolysis. In either case the substances must have been non-dialyzable. The first possibility I did not consider at all, for I must confess that I would have no idea of the possible chemical character of such non-dialyzable waste products. On the other hand, it seemed to me that the second possibility had much in its favor. The fact that older culture filtrates give a more intense reaction than young cultures, coupled with the results of the dialysis experiment, seemed to point in that direction. It occurred to me that in this case the artificial destruction of a culture by means of pepsin-hydrochloric acid might lead to the liberation of a larger amount of such products, and accordingly the following experiment was undertaken: A 48 hour culture of the organism was digested with pepsin-hydrochloric acid (0.3 pro mille) for three days, passed through the Chamberland filter and the filtrate heated until all thymol (which had been added, together with the pepsin-hydrochloric acid) had been driven off. This solution was nearly neutral in reaction—perhaps faintly alkaline—in the end. After having been proved sterile an animal was injected with 5 c.c. The reaction is seen in Fig. 17.

The effect was thus quite analogous to the result which is obtained after the injection of a non-digested culture-filtrate, and after 24 hours the animal had entirely recovered. In view of this comparatively moderate reaction the idea suggested itself that the cleavage had possibly not been sufficiently extensive, or that the pep-

sin-hydrochloric acid digestion was indeed inadequate to liberate the products in question. The experiment was therefore repeated, but an active pancreatin preparation substituted for the pepsin. The digestion, moreover, was continued for 9 days at 37° to 40° C. The mixture was then passed through the Chamberland, the thymol removed by heat, and 5 c.c. of the resultant solution injected. The liquid showed a rose biuret reaction and was unquestionably free from albumoses. The result was very interesting. The animal became very ill, and while it recovered it did so much more slowly than after the injection even of an old untreated culture (killed off by heat). Six hours after the injection the absolute number of the eosinophiles had fallen from 552 to 58, while the amphophiles had risen from 1632 to 17,105 (!), and at the end of 24 hours the eosinophiles were absent. The true extent of this reaction will be best appreciated, perhaps, by comparing the resultant Fig. 18 with one which was obtained in the same animal shortly before after injecting 5 c.c. of a 48 hour culture which had been killed by boiling (Fig. 19). It thus appears that the hydrolytic destruction of the bacterial cultures leads to the liberation of molecular complexes, which in their action upon the animal are quite analogous to products which are found in any culture of the organism. I am inclined to attribute the resultant effect to the action of products of bacterial autolysis. To test this point directly a 24 hour culture of the pyocyanus bacillus on agar was washed off with sterile normal salt solution. The suspension was placed in a sterile test-tube, and left in the incubator for 40 hours. It was then passed through the Chamberland filter and 5 c.c. of the boiled filtrate injected intraperitoneally. The result is seen in Fig. 20, and fully bears out the correctness of the conclusion to which I had already been led.

While it has thus been established that in the guinea pig the intraperitoneal injection of soluble bacterial products leads to changes both in the absolute and relative number of the amphophiles and eosinophiles in a manner perfectly analogous to what we see in the human being in the case of the neutrophiles and the eosinophiles, these bodies in themselves are hardly concerned in the production of immunity. This is readily seen by studying Fig. 19, which was obtained with an animal which had been injected

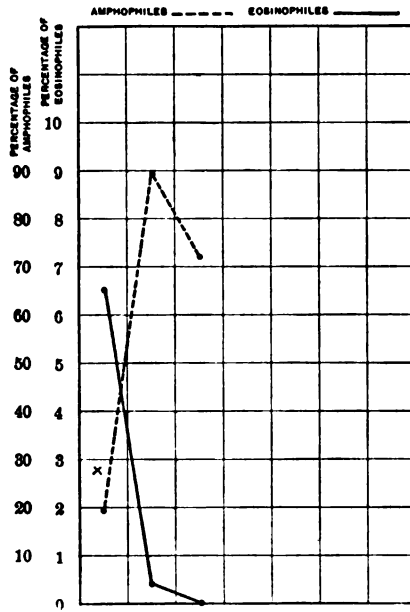


FIG. 18.—Note the intense reaction after the injection of 5 c. c. of a trypsin-digested and filtered bouillon culture.

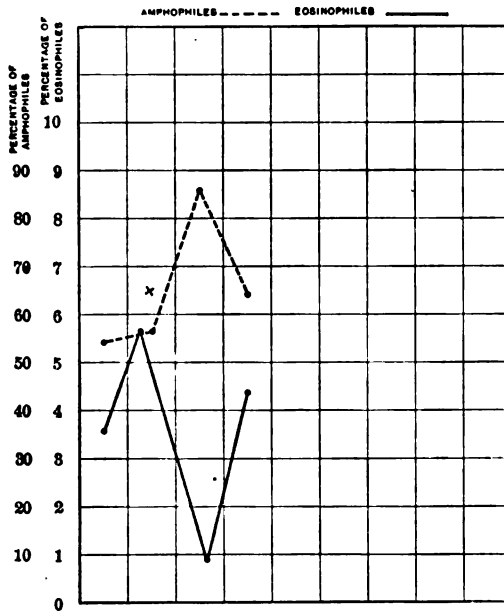


FIG. 19.—Reaction after injection of 5 c. c. of a 48 hour culture (killed off by boiling) in the same animal a few days before.

ten times with bacteria and bacterial products, and in which there was no evidence in the end of protection. As it is possible, however, to immunize the guinea pig against the pyocyaneus bacillus by the use of living cultures, the negative result in our work is undoubtedly referable to the fact that the products which were injected had been previously boiled. But as immunization can be effected by the use of bacterial filtrates also, the conclusion seems to be justifiable that this is referable to the same source as the special reaction products, that is, to the action of intracellular ferments.

Regarding the rôle which the eosinophile plays in the reaction against bacteria and bacterial products our knowledge is still very imperfect. Opie has shown that following the injection of such organisms as *Bacillus pyocyaneus*, *Bacillus mucosus capsulatus*, and *Bacillus anthracis*, the eosinophiles and large mononuclear elements at first disappear from the peritoneal fluid, forming compact clumps which adhere in great part to the surface of the omentum, but that at the end of about one hour they reappear. An active immigration of eosinophiles, particularly from the blood-vessels of the mesentery then takes place into the surrounding tissues, the number being the greater the larger the number of organisms and the greater the degree of virulence. Similar changes take place below the peritoneum of the abdominal wall and below the serosa of the viscera, though to a less extent. In the peritoneal fluid their number again decreases, while the amphophiles accumulate in immense numbers.

Upon the surface of the omentum the eosinophiles undergo degenerative changes of which nuclear fragmentation is the most characteristic. Opie could not obtain evidence that the cells discharge their granules, nor was he able to demonstrate that they act as phagocytes. This I could confirm, while the amphophiles in animals which had succumbed to the infection, were for the most part well filled with bacteria. (See also the observations on the non-phagocytic action of the eosinophiles in my own blood.)

If, however, the eosinophiles do not enter the struggle either as phagocytes or by the discharge of their granules, what can their action be? That they do take a part cannot be doubted, for how

else could their invariable presence about foci of infection be explained. Aside from peritoneal infections we find a zone of eosinophiles surrounding the young trichinæ in the muscle tissue; we find the same along the outer zone of malignant growths; in the tissues of pus-tubes, in the inflamed appendix, etc., etc. I must confess that I cannot overcome the impression that the eosinophilic leukocyte is after all a glandular structure, in which the granules represent, or are analogous to, gland cells, in which the specific secretory product is elaborated. The impression is conveyed by most writers that the eosinophilic granule is a solid granule,

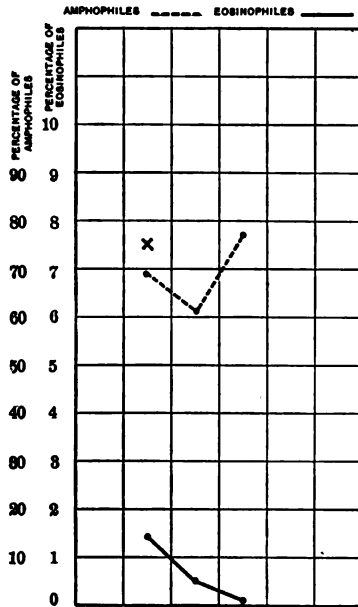


FIG. 20.—Reaction after injection of 5 c.c. of an autolyzed suspension of bacilli. The growth in this case had been an ordinary 24 hour culture in a test tube of slant agar; the reaction is typical although not so extensive as with products obtained from larger amounts of bacteria.

and as a matter of fact one does see such apparently solid masses in many cells. More detailed investigation, however, with adequate stains, such as the eosinate of methylene blue, brings out the fact that the majority of the eosinophilic granules are in reality little vesicles which seem to be composed of a deeper staining outer wall

and lighter staining contents. These contents, I imagine, represent the specific secretory product, which may leave the cell without the destruction of the remaining sacs, and that these latter possibly in the empty state take on the solid aspect.

Regarding the character of the secretory product of the eosinophiles I further imagine that in some manner its function has reference to nutrition, and that under pathologic conditions also this is probably quite analogous to what occurs in health.

Progress of Medicine

DURING THE YEAR 1905

TREATMENT

BY A. A. STEVENS, M.D.

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INFECTIOUS DISEASES

TYPHOID FEVER.—E. F. Cushing and T. W. Clarke¹ draw the following conclusions as to the results and usefulness of *copious water drinking in the treatment of typhoid fever*. Large quantities of water internally, a gallon or more in twenty-four hours, may easily be taken by typhoid fever patients if administered in small quantities at frequent and definite intervals. A copious elimination of watery urine at once follows, the degree of polyuria, day by day, closely corresponding to the quantity of fluid ingested. Patients are more comfortable by this mode of treatment and toxic symptoms are lessened. The mortality, as well as the severity of typhoid fever, seems to be still further diminished by this method of hydrotherapy employed as an accessory to the cool-bath treatment of the disease. The total mortality of 100 cases was 5 per cent. Four deaths occurred among the 54 cases with a urinary elimination below 160 ounces and one death in 46 cases with a urinary elimination above 160 ounces. Four ounces of water were given every fifteen minutes during the waking hours (eight to fourteen pints in the twenty-four hours) and in addition the patient received every two hours during the day, and once or twice at night alternately six ounces of milk and six ounces of albumin-water, or about three pints more of fluid.

¹ Amer. Jour. Med. Sciences, Feb., 1905.

J. E. Cannady² recommends *bisulphate of sodium as a non-toxic intestinal antiseptic* that keeps the mouth clean, promotes digestion by its acidity, prevents tympanites and lessens diarrhea. He gives two ounces (60 c.c.) of a solution containing $7\frac{1}{2}$ grains of sodium bisulphate to the ounce (0.5 gram to 30 c.c.) every three hours. The mortality of 85 cases treated in this way was 8.02 per cent.

Richardson³ has treated 22 patients with typhoid fever with a filtrate of a *bouillon culture of the typhoid bacillus*. A reaction characterized by a chill, rise in temperature and increased frequency of pulse and respiration occurred in one half the cases thus treated and is attributed to the action of intracellular toxins. Richardson believes that the treatment is best suited to patients who can respond to extra stimulation and can stand a temporary hyperintoxication resulting from the increased destruction of bacilli. In the series of twenty-two cases there were two deaths.

J. A. Scott⁴ has studied 50 cases of *typhoid fever* in which either operation or autopsy verified the presence of a *perforation*. Thirty-nine cases were submitted to operation, with 12 recoveries; the 11 cases not surgically treated all ended fatally. Scott believes that operation is called for in every case as soon as the diagnosis is made, closure of the perforation and drainage being all that is required.

SCARLET FEVER.—E. Ausset⁵ discusses the *treatment of scarlet fever* under three headings: (1) To combat the pyrexia and to sustain the organism. The temperature should be controlled by baths, beginning at 82°F., and, if necessary, lowered to 68°F. So low a temperature as the latter should never be employed unless a good reaction is obtained. The bath acts as a heart sedative and a nerve tonic as well as an antipyretic, and it is ill-advised to attempt great reduction of temperature by this means. To sustain the system, tonics such as kola or canella are indicated. (2) To eliminate the toxins. Fluid diet and the baths assist diuresis, but the latter should be still further aided by the administration of large quantities of liquid. Theobromine (30 grains, 2 grams per day) is of great value in this connection. Intestinal irrigation with saline solution, according to the author, may produce albuminuria and edema. The bowels should be kept freely open. The heart action should be watched, and if a tonic is necessary, spartein sulphate ($\frac{1}{6}$ to $\frac{1}{4}$ grain, 0.01 to 0.016

²Therapeutic Gazette, Feb., 1905.

³Jour. Experiment. Med., Feb., 1905.

⁴Univ. Penn. Med. Bulletin, May, 1905.

⁵Annal. de la Policlinique de Paris, 1905, No. 4.

gram) may be given hypodermically. Digitalis is toxic and caffen excitant in children. (3) To stimulate the nervous system. Alcohol in the form of champagne may be given in small doses and hypodermic injections of camphor may be employed. Heart failure is best treated by baths at 90° to 95° F. and oxygen inhalations.

L. Mendelsohn ⁶ reports upon the results obtained in a series of 146 cases of scarlet fever in which Aronson's *antistreptococcic* serum was used. The mortality was 9.2 per cent., which is no better than the results obtained without serum. The septic and malignant cases all did badly.

K. Preisich ⁷ has tested the *method of Widowitz*, which consists in the administration from 1 to 8 grains (0.06 to 0.5 gram) of *hexamethylamin* (urotropin) three times a day, with a view to the *prevention of nephritis*. He administered the drug in 600 cases and compares the results with those observed in 600 other cases similarly treated, except that the drug was not given. Nephritis occurred in 13.6 per cent. of the cases in which no hexamethylamin was used and in 9.16 per cent. of those receiving the drug. The course of the disease was more favorable with the hexamethylamin than without it. K. Patschkowski ⁸ has used *hexamethylamin* in 52 cases of scarlet fever at the Charlottenburg Hospital. Of this number only 3.8 per cent. developed nephritis. At the same hospital, in the two years before the adoption of this treatment, 225 cases of scarlet fever were treated. After subtracting the cases in which death occurred soon after admission or in which nephritis was present on admission, 177 cases remain. Of this number 20.9 per cent. developed nephritis.

DIPHTHERIA.—F. Wesener ⁹ reviews his experiences with 1,745 cases of *diphtheria* at Aix. It is his practice to inform the person accompanying the child to the hospital of the spread of the disease, and to propose to give all the children in the family a preventive injection of serum if they are brought to the hospital. This is usually done, and nearly 250 of such injections have been made. Only 4 of the children thus protected contracted the disease, and in 3 it developed within 48 hours, showing that it must have been already installed. In the single failure the disease was extremely mild. The period of protection lasts about three or four weeks.

Biernacki and Muir ¹⁰ report on 45 cases of *diphtheria* in which

⁶ Deut. med. Woch., March 23, 1905.

⁷ Therap. der Gegenwart, xlv, No. 5, 1905.

⁸ Therap. Monat., Dec., 1904.

⁹ Münch. med. Woch., March 21, 1905.

¹⁰ Lancet, Dec., 24, 1904.

antitoxin was given by intravenous injections. This method has been especially extolled by Cairns, who claims that it results in a prompt subsidence of glandular enlargement and a strikingly rapid decline in the toxemia. In 50 cases, 20 of which were treated by this method, there was a mortality of only 6 per cent. Of these 17 were tracheotomy cases, with only 1 death, a mortality of only 5.8 per cent. Bier-nacki and Muir have tried the method in 7 cases with 5 deaths in one series, and in another in 38 cases with 3 deaths. They believe that in estimating the beneficial effects of antitoxin administered by the veins those cases should be discounted in which a marked improvement follows intubation or tracheotomy, since this may be due mainly or entirely to relief of the obstruction. Nevertheless, it is noted that of 9 cases operated on early, only 1 died, which must be regarded as a low mortality. Even in cases other than laryngeal, it would seem to the authors very difficult to say of any individual patient that a better result was obtained than might have followed subcutaneous injection.

White and Smith¹¹ present an interesting study of the *heart complications* in 946 cases of *diphtheria*. They believe that it is usually safe to allow the patient to be out of bed at the end of two weeks if the disease has been mild. The presence of murmurs and a slight degree of irregularity are no contraindications, if the first sound is strong and the heart is not dilated. Patients who have been severely ill or ill several days without treatment should not be allowed out of bed for four or five weeks, even if the pulse is normal in rate and of fair strength. Experience has shown that after 4 or 5 weeks a patient with well marked murmurs and irregular pulse, even if rapid, experiences no ill results from being allowed to sit up, if the heart is carefully watched. In cases with a murmur and little irregularity the treatment should be directed to improving the general condition of the child. The patient is allowed to sit up after two or three weeks of illness but active exercise is forbidden. Digitalis and alcohol rarely do any good; strychnin is the best drug and should be given in doses of $\frac{1}{100}$ grain (0.001 gram) every four hours for a child of five to ten years. In many cases larger doses seem to be useful and produce no unfavorable effects.

Patients with persistently rapid pulse should be kept in bed at least 4 or 5 weeks, and then allowed to sit up for short and progressively longer intervals, the heart being carefully watched on each occasion. Strychnin seems to be the only drug of value. In patients with

¹¹ Boston Med. and Surg. Jour., Oct. 20, 1904.

gallop rhythm absolute rest in bed is necessary, and a liquid diet should be given. At the first appearance of vomiting food should be given by the rectum and cracked ice by the mouth for thirst. Strychnin in doses of $\frac{1}{60}$ to $\frac{1}{40}$ grain (0.001 to 0.0016 gram) every four hours for children three years or over may be given with the best results, although drugs influence this condition but little. When there is vomiting strychnin should be given hypodermically. Cocain in doses of $\frac{1}{12}$ grain (0.005 gram) every 4 to 6 hours in ice-cold water at times relieves the vomiting; alcoholic preparations, even champagne, are not well borne, and often increase vomiting. Morphin in doses of $\frac{1}{16}$ to $\frac{1}{8}$ grain (0.004 to 0.008 gram) depending on the age, is of value in quieting restlessness. Predigested beef products, if given in small amounts, are often retained when everything else is rejected. Hot applications to the epigastrium sometimes relieve vomiting and pain. Digitalis is useless and usually increases the vomiting. Sudden deaths have occurred in the author's series of cases from asphyxia but not from heart complications. Patients with bradycardia require no special treatment beyond rest in bed and the use of strychnin. Long duration of murmurs and irregularity of the heart indicate the necessity for following cases of diphtheria long after convalescence, to study and prevent possible permanent changes in the heart. The after-treatment in all except the mild cases consists in watching the effect of gentle exercise upon the heart for several months at least and grading it to meet individual requirements.

RHEUMATISM.—Rubens'¹² experience with 60 cases of various affections treated by *intravenous injections of small amounts of salicylic acid* has been very favorable. In articular rheumatism the author found that the effect was remarkably prompt, but in the small doses employed, the duration of the disease did not seem to be materially shortened. In neuralgia, however, the effect was so prompt and decided that he regards intravenous salicylic medication as an absolute specific for this affection and also for muscular rheumatism. No effect was discernible in influenza, but two patients with pleurisy were cured with four injections. Rubens injects the following solution into a vein in the arm: Sodium salicylate, 6 grains (0.35 gram), and caffein, 1 grain (0.05 gram), with distilled water, 30 minims (2.0 c.c.) This is the same as Mendels' formula, which was decided upon after long experience.

Hecht¹³ has used a 10 per cent. ointment of *guaiacol and salicylic acid* in acute articular rheumatism and in pleurisy with good results.

¹² Deutsch. med. Woch., Jan. 19, 1905.

¹³ Münch. med. Woch., 1905, No. 9.

Its employment caused no unpleasant effects, even in children. In adults the effect of the treatment was not so prompt as in children, due to the fact that the skin of the former absorbs less readily. In pleurisy with effusion the results were uniformly excellent, in early cases the fluid being absorbed in from 5 to 9 days. If the ointment causes irritation of the skin, a new area should be used for each application.

WHOOPIING-COUGH.—H. Koppe¹⁴ advocates the use of *aristochin*, a carbonic ester of quinin appearing as a colorless, tasteless powder, soluble in alcohol and hydrochloric acid, but insoluble in water. At first it is administered once or twice daily, but after a few days the patient should receive from three to five doses a day. The dose for a child under a year old is from 3 to 4 grains (0.2 to 0.25 gram); for those beyond this age $7\frac{1}{2}$ grains (0.5 gram) at a time, given with the pulp of fruit. A short time afterward the patient should receive a few drops of diluted hydrochloric acid through a tube. No unpleasant sequels have been noted.

Passalaequa¹⁵ has employed *diphtheria antitoxin successfully in 7 cases of whooping-cough*. The effect of the serum was manifested after one injection, but three or more were necessary to obtain a complete result. This treatment, according to the author, is especially indicated in cases with bronchial or pulmonary complications.

T. W. Kilmer¹⁶ reports his observation of 18 consecutive cases of *whooping-cough* treated according to a method suggested by him in 1903. This method consists in the *application of a slightly constricted silk-elastic abdominal belt*. A stockinette band extending from the axillæ to the pubes is snugly applied and prevented from slipping down by two muslin shoulder straps. On this band a single width of silk elastic bandage is sewed, extending entirely around the body and covering the abdomen. The lower projecting portion of the stockinette band is pinned to the outside of the diaper or other clothing, thus keeping the elastic belt smooth over the abdomen. The principal success of this procedure seems to lie in the control of the obstinate vomiting, especially in young infants, in whom this feature of the disease constitutes the greatest danger. Should the vomiting continue after the belt has been applied the latter may be slightly tightened with expectation of satisfactory results. In the series of 18 cases the vomiting attacks were reduced from 3951 a week to 463 a week.

¹⁴ Deutsche Aerzte-Zeitung, 1905.

¹⁵ Rev. Française de Med. et de Chirurg., 1905, No. 11.

¹⁶ Jour. Amer. Med. Assoc., Dec. 10, 1904.

TUBERCULOSIS.—W. P. Porcher¹⁷ calls attention to the great *value of absolute rest of the larynx in the treatment of laryngeal and pulmonary tuberculosis*. By absolute rest he means the total cessation of phonation, the amount of cough being limited by judicious local and constitutional treatment to the least possible quantity.

Mouisset¹⁸ protests against *the overfeeding of the tuberculous*. Brehmer and Detweiler, he says, have defined the essential treatment of tuberculosis as consisting of free air, rest and feeding, but this generally accepted formula contains no excuse for advising a patient to eat as much as possible. He argues that the consumption of 28 eggs daily or 800 grams of raw meat, which has been recorded, by disturbing digestion and overloading the system with nitrogenous matter causes an intoxication and helps the progress of the tuberculous lesions. He concludes that three generous meals a day are sufficient as a general rule, that the amount of nitrogenous food should be limited, and that if raw meat or eggs are given, they should replace cooked meat and not be given in addition to the regular meals. Richet,¹⁹ on the other hand, concludes from experiments on dogs that the amount of *nitrogenous material required during the first stages of tuberculosis* is from 25 to 100 per cent. more than is required by the normal individual. Philip²⁰ has published the results of his experience with *the treatment of tuberculosis by large quantities of raw meat or raw meat-juice*, which was originally suggested by Richet, together with the results of some work on the effect of zomotherapy on metabolism which was done by Galbraith under his direction. Galbraith's observations were made on healthy and tuberculous patients, in whom the nitrogenous value of the foods was maintained as nearly constant as possible. The experiments showed that under raw meat feeding there was a marked increase of nitrogenous retention, provided that the heat value of the nitrogen in the diet exceeded the actual requirements of the individual per kilo of body weight. They also showed improved intestinal metabolism and a marked digestive leukocytosis. These results were probably not from overfeeding *per se*, for if this were the case cooked meat should have had the same effect. Philip thinks that there is probably some enzyme in raw meat, which is destroyed by heating and that this explains the difference in action between raw and cooked meat. The results obtained by Philip were encouraging, even in some cases, in the third

¹⁷ Amer. Jour. Med. Sciences, Sept., 1905.

¹⁸ Lyon Med., Oct. 29, 1905.

¹⁹ Rev. de Med., vol. xxv, No. 1.

²⁰ Practitioner, Jan. 1905.

stage of the disease, but the best results were obtained in the earlier stages. These consisted in a gain in weight of from 10 to 30 pounds, a slowing of the pulse rate, an increase in the blood pressure, an increase in hemoglobin, a more pronounced digestive leukocytosis, lowering of temperature, and regression of local signs.

H. K. Pancoast²¹ in presenting the results obtained at the Hospital of the University of Pennsylvania in the *treatment of deep-seated tuberculosis by means of the x-rays*, states that there have been more failures than positive results, but that an occasional cure in conditions for which successful therapeutic agents are still undiscovered, should give to the x-ray specialist the stimulus to put forth his best efforts in a field open for so much research. He concludes that tuberculous laryngitis may be aided and even cured by x-ray treatment, provided there can be brought about an improvement in the primary pulmonary condition, however that may be induced; that too vigorous treatment will cause a reaction, which may be carried to an unfavorable degree, and hence great care is necessary in determining the proper dose in each case; that pulmonary lesions may be benefited probably, in selected cases, but very great precautions should be observed; and that Finsen-light applications are probably of no value in laryngeal lesions.

Pochorecki²² has found *potassium telluride of service in checking night-sweats*. A dose of from $\frac{1}{3}$ to $\frac{1}{2}$ grain (0.02 to 0.03 gram) at bedtime is recommended, although in mild cases smaller doses are often effectual. Rarely after long usage the dose had to be increased. Occasionally large doses caused intestinal disturbance. The chief drawback to the remedy is the alliaceous odor which it imparts to the breath for several weeks after administration has been stopped, although this is not perceptible to the patient. H. Ulrici²³ reports that he has employed *veronal for night-sweats* in more than thirty cases. He gives 5 grains (0.3 gram) in tea at bedtime, and while for the first night or two the sweating is not affected, as a rule, by the third night the symptom disappears. Occasionally the dose had to be increased to $7\frac{1}{2}$ grains (0.5 gram). When the good effect of the drug has been obtained, the medication is stopped, to be begun again when the sweats return, which they usually do in a week or two. The author considers veronal to be more certain as an antihydrotic than either atropin or agaracin.

²¹ Therapeutic Gazette, Aug., 1905.

²² Journ. de Med. de Paris, 1905, No. 15.

²³ Therap. Monatschifte, 1904, No 12.

SMALLPOX.—A. Love²⁴ describes the results obtained in *the treatment of smallpox by ichthyol*. The latter was given in doses of 40 grains (2.5 grams), in the form of chocolate-coated tabloids, three times in the 24 hours. In some cases the drug was also applied externally as an ointment. One hundred patients were under observation. In none of the cases was there any indication that the drug influenced the disease as regards either duration or severity.

CEREBROSPINAL FEVER.—Stockton²⁵ gives the following advice as to *the treatment of cerebrospinal fever*. Absolute quiet in a well-ventilated, darkened room. The trial of the hot baths after the method of Aufrecht in all cases in which they seem to do good. The practice of spinal puncture, with drainage when necessary to relieve severe pressure symptoms, to be repeated, if necessary, provided benefit follows the first puncture. *The use of antipyrin in cases in which the temperature is raised*, not only for the relief of this symptom, but for the mitigation of headache and hyperesthesia. The use of opium or the bromides, alone, or in connection with antipyrin, if necessary, for the relief of convulsions, pain, hyperesthesia, and pressure symptoms generally, which are not relieved by the foregoing methods of treatment. The use of mercury when needed for its laxative effect, or to assist in stimulating the organs of elimination.

Foster,²⁶ Tobler,²⁷ and Lenhartz²⁸ all speak very favorably of lumbar puncture as a means of relieving pressure symptoms in cerebrospinal fever. H. Lenhartz²⁹ from an experience with *lumbar puncture in 45 cases of epidemic cerebrospinal fever* is convinced that this procedure, systematically and repeatedly employed, has a decidedly favorable effect upon the disease. E. Waitzfelder³⁰ gained a favorable impression of the value of *injections of diphtheria antitoxin in 17 cases of cerebrospinal fever*, but Peabody³¹ was unable to see any influence either for good or evil from this method of treatment in 22 cases of the disease.

RABIES.—G. Tizzoni and A. Bongiovanni³² describe two series of experiments which have attracted much attention. In the first, the

²⁴ Glasgow Med. Jour., Nov. 1905.

²⁵ Amer. Med., April, 1905.

²⁶ Amer. Jour. Med. Sci., June, 1905.

²⁷ Correspondenz-Blatt. f. Schweiz. Aerzte, 1905, No. 7.

²⁸ Semaine Méd., 1905, No. 13.

²⁹ Münch. med. Woch., March 21, 1905.

³⁰ Med. Record, March 11, 1905.

³¹ Med. Record, May 13, 1905.

³² Reforma Medica, 1905, No. 18.

virus of rabies was exposed *in vitro* to the action of radium rays; in the second, animals were inoculated in the eye, or sciatic nerve, or under the dura mater with virus, and the part was then exposed to the rays for an hour a day for eight days. The results indicate that the *radium rays destroy the virus of rabies* both *in vitro* and in the living animal. In the animals the effect was the same whether the part inoculated was exposed to the rays or some distant region. The virus exposed *in vitro* appeared to have been deprived of all toxic properties when injected into the eyes of animals afterward. When exposed only for a short time, it caused a slow, wasting, fatal affection, different in every respect from typical rabies. When animals inoculated in one eye with the virus were exposed at once to the radium rays, the virus was rendered harmless, even when only the opposite eye was exposed to the rays. Also, when the animal had been inoculated in the meninges or sciatic nerve, exposure of one eye sufficed to annul the toxic effect of the virus anywhere in the body. In a later communication, Tizzoni and Bongiovanni³³ further assert that fixed virus submitted to the action of the radium rays becomes transformed into an effectual vaccine. They found that one drop of this vaccine injected into the eye induced stable immunity to virus which killed the controls in twenty days.

ANTHRAX.—T. M. Legge,³⁴ in a lecture delivered before the Royal College of Physicians of London, stated that 12 cases of anthrax had been treated in England by *Sclavo's antianthrax serum* since July, 1904. In 4 of these, serum alone was used and death occurred in one case. In 8 patients excision was practised in addition to the administration of serum, and of these 2 died.

PLAGUE AND CHOLERA.—Lew³⁵ concludes from the history of Haffkine's work in India, that his method of *vaccination renders contagion of plague three times less probable* than without it, and a fatal termination two times less probable; that is, it reduces the chances of death to one-sixth the non-vaccinated subjects. Haffkine's anti-cholera vaccination has now established itself on such a footing that its results are no longer published any more than those of vaccination against smallpox.

³³ Gaz. deg. Osped., 1905, No. 127.

³⁴ British Med. Jour., March 18, 1905.

³⁵ Presse Méd. 1905, No. 71.

DISEASES OF METABOLISM

GOUT.—C. von Noorden and L. Schliep³⁶ consider that a knowledge of *endogenous and exogenous uric acid* has smoothed the way for a better understanding of the conditions accompanying gout and the recognition that the production of uric acid may be kept at its minimum by giving a diet which is free from purin bodies. The fact that at times the gouty patient retains considerable quantities of uric acid is of importance in the study. The cause of the uric acid retention is not to be found in the kidney, but is probably due to a peculiar pathologic combination of uric acid in the organism which renders excretion difficult. It is uncertain in what relation the retained uric acid stands to the gouty processes, and especially to the attack, but it appears that the older views are more acceptable now than they seemed to be a short time ago. If one keeps a gouty patient for a long time on diet which allows of a complete elimination of the endogenous as well as the exogenous uric acid, and then adds a large quantity of purin-containing foods, an attack of gout frequently takes place within a few days. The urine during this time contains only a small amount of uric acid. The authors have for the past two years examined gouty patients with a view of determining their limits of tolerance. First, they gave a purin-free diet, and determined the value of the endogenous uric acid. They then gave 200 grams of beef (weighed raw) on two consecutive days. This represents 0.24 gram of purin; 50 per cent. of this disappears in the organism, partly due to faulty absorption and partly to oxidation, while the other 50 per cent. should appear in the urine as uric acid or purin derivatives. During the two days, therefore, they expected to find 0.24 gram of purin bases or 0.72 gram of uric acid over and above the uric acid excreted as endogenous material. Normally, the excretion may be completed during the following one or two days. In the case of the gouty, matters, however, are different. As a rule, excretion during the two experiment days is but little altered from the previous excretion, and the elimination is spread over a longer period and is far less complete than in the case of the normal individual. One learns whether the patient is capable of dealing with 400 grams of beef, and in rare cases in which this quantity is tolerated, there is no reason why the patient may not be given this amount. If, on the other hand, the patient cannot deal with this quantity, the amount

³⁶ Berlin. klin. Woch., Oct. 9, 1905.

should be lessened until it reaches a quantity which, reckoned as purin bases, can be fully eliminated.

O. Minkowski⁸⁷ in discussing *the treatment of gout*, writes that regulation of diet, withdrawal of harmful or excessive substances, stimulation of tissue-change by work and exercise, hydropathic and balneopathic means are the chief factors in correcting the metabolic fault. When the acid in the stomach is deficient, large doses of hydrochloric acid, as recommended by Falkenstein, may further assist in this direction. In preventing the overloading of the system with uric acid, one should aim at diminishing the formation of it and at increasing its excretion. The former can be brought about by decreasing the intake of those substances (purin bases) from which uric acid is formed. Especially the glandular organs must be avoided in diet, such as thymus, liver, and kidneys, and meats and meat extracts must be allowed only in moderate quantities. Fermenting drinks, especially beer, which contains nucleins, are also harmful. Purgatives act beneficially, probably, by removing the excess of these substances. It has been claimed that certain drugs are capable of diminishing the manufacture of uric acid, but there is so far little proof that they possess such action. Quinic acid, urosin, sidonal and ural, are said to be efficacious. It is possible, however, that quinic acid and its preparations may act in some other way. Increased excretion of urates may be stimulated by plentiful intake of water. Salicylates are said to increase elimination, but any good effects they may exert seem to be due to their anodyne action. Drugs capable of forming soluble compound with urates are also recommended by some writers, but it is doubtful, according to Minkowski, whether they produce such compounds in the organism, although urotropin and citarin are reported to have a good effect. Lastly, the author mentions colchicum, the use of which is purely empiric.

Floret⁸⁸ contends that *citarin*, a compound formed by the action of formaldehyde on sodium citrate, is the best drug which we possess in the treatment of both acute gout and acute exacerbations of chronic gout. It is said to be absolutely harmless and of an agreeable taste. The dose recommended is 30 grains (2.0 grams) three or four times a day.

DIABETES MELLITUS.—J. Friedenwald and J. Ruhräh⁸⁹ publish some observations on the *effect of certain diet cures in diabetes mellitus*.

⁸⁷ Deut. med. Woch., March 16, 1905.

⁸⁸ Deut. med. Woch., Jan. 26, 1905.

⁸⁹ Amer. Jour. Med. Sciences, Oct., 1905.

They agree with von Noorden and other recent writers that it is rarely advisable to place patients on an exclusive *milk* diet, except in those severe cases in which diacetic acid is present in the urine and in which the patient is threatened with coma. On the other hand, they have often utilized from $\frac{1}{2}$ to 1 liter of milk daily in addition to other allowable foods with good results. As regards the use of potatoes, as recommended by Mossé, they find that a patient who is permitted to consume 100 grams of bread a day can take 300 grams of potatoes, so that at least a certain proportion of bread can be replaced by this form of food. When care was taken to regulate these proportions they have never seen the slightest harmful effect produced by the use of potatoes, even in severe forms of diabetes. In a not inconsiderable number of cases very beneficial results were obtained from their use. It is pointed out that the potato lends variety in supplying carbohydrate food in as much as it can be prepared in various ways, and that, moreover, it affords a means of supplying fatty food, like butter, in rather large quantities. As to the oat-meal cure of von Noorden, they find it especially useful in those forms of diabetes exhibiting diacetic acid in the urine, but that in mild forms of the disease it is either useless or harmful.

E. P. Joslin⁴⁰ states that *to rid the urine of sugar* it may be necessary not only to withdraw the carbohydrates from the diet but also to limit the quantity of albumin ingested. If this does not suffice the patient must be put on a strict vegetable diet, and occasionally a starvation day will be necessary. When once the urine has been freed from sugar the patient should be kept on the same diet by which this has been attained for several days, then cream may be added, and later milk. According to Joslin the diabetic diet is really a diet in which carbohydrates are replaced by fats. It is necessary for the patient to eat from two to five times as much fat as usual. Comparatively little of this fat can be taken as meat, and this necessitates the use of much cream, butter, and oil. The diabetic's chance for life depends on his ability to eat fat and consequently great care must be exercised not to prejudice him against its digestibility. It is well to remember that fat is very well digested, as a rule, if taken in the form of milk-fat or oil. Not over 5 per cent. remains unassimilated, and this rule holds good for diabetics, except in the rare cases of marked pancreatic disease. Drugs do not permanently increase the tolerance for carbohydrates. There are as yet no specific remedies. The treatment of coma, Joslin states, is chiefly preventive.

⁴⁰ Boston Med. and Surg. Jour., July 6, 1905.

G. G. Sears ⁴¹ reports the case of a boy with *diabetic coma* who was treated successfully by the administration of large quantities of alkalis. On admission to the hospital he was given 8 ounces (240 c.c.) of sterile salt solution, containing sodium bicarbonate almost to the point of saturation, under the skin of each breast. A solution of the same drug (a heaping teaspoonful to the tumbler) was given by the mouth to the limit of his capacity. No record of the amount was kept, but, as he was very thirsty, large quantities were taken. His stupor rapidly decreased, but he remained drowsy for several days. In spite of the large doses of alkali the urine remained persistently acid. The patient made a complete recovery, although suppuration occurred at the site of the injections.

DIABETES INSIPIDUS.—B. Stein ⁴² has successfully treated a resistant case of diabetes insipidus by subcutaneous injections of strychnin nitrate. A daily dose of $\frac{1}{45}$ grain (0.001 gram) was very gradually increased to $\frac{1}{12}$ grain (0.005 gram). In four weeks the quantity of urine had diminished from 12 or 15 quarts daily to $3\frac{1}{2}$ or 4 quarts, the polydipsia had become less marked, and the body-weight and strength had considerably increased. B. Leick ⁴³ and L. Feilchenfeld ⁴⁴ have also spoken favorably of this method of treatment.

EXOPTHALMIC GOITER.—G. Dreyfus ⁴⁵ reviews the recent developments in the treatment of *exophthalmic goiter*. He states that iodine has fallen into disuse. The cases benefited by it probably belong to the secondary form of the disease in which the enlargement of the thyroid gland precedes by a long time the other symptoms. Kocher's treatment by phosphates has been successful in some cases, but in many cases no benefit has been obtained. Two cases are described in which the use of ovarian extract was followed by rapid improvement and apparent cure. The two lines on which treatment has been developed are organotherapy and surgical intervention. There are several forms of organotherapy. The administration of the milk of goats upon which thyroidectomy has been previously performed has been tried in ten cases and from external cause is not likely to come into general use. More or less marked improvement was recorded in each of the 10 cases and in one of them permanent recovery was said to have resulted. Subcutaneous injections of antithyroid serum have not been

⁴¹ Boston Med. and Surg. Jour., Nov. 30, 1905.

⁴² Münch. med. Woch., 1904, No. 36.

⁴³ Deut. med. Woch., 1904, No. 33.

⁴⁴ Deut. med. Woch., 1903, No. 31.

⁴⁵ Zentralbl. f. d. ges. Therap., Aug., 1905.

satisfactory. Antithyroid serum, in the form of rodagen (a powder prepared from the milk of goats after thyroidectomy) usually affects the symptoms, the improvement being manifested as a rule in the general condition, and in the size and consistency of the thyroid gland. The effect on the exophthalmos and tremor is uncertain, although often good. The heart condition is seldom benefited. The frequency of relapse when the treatment is discontinued is very marked. One hundred and twenty-seven recent cases of operation have been collected from the reports of different operators. Complete recovery followed operation in 75.7 per cent. of the cases, great improvement in 10 per cent., slight improvement in 2.4 per cent., no improvement in 4 per cent., and death in 7.9 per cent. The fatal cases included 3 of collapse, 1 of shock, 2 of hemorrhage, 1 of embolism, and 1 of pneumonia. When it is remembered that only severe cases were operated on and that in all but two of the cases the period of observation after operation was longer than one year, and in some cases longer than four years, the author does not believe that results so favorable can be reported from any other method of treatment.

H. Mackenzie⁴⁶ states that the first essential in the *treatment of Graves's disease* when the symptoms are severe is absolute rest of body and mind. The patients are usually very tolerant of cold, and open-air treatment is very effective, and abundant, wholesome and nourishing diet is essential. Diarrhea, which is sometimes severe in acute cases, must be treated by careful selection of food and the use of bismuth or tannalbin or tannigen. Massage may prove beneficial in bed-ridden patients. Warm baths, especially warm saline baths, sometimes have a quieting influence on the heart. When the patient is able to be up and about, change of climate is often efficacious. One of the most useful drugs, especially when nervous symptoms predominate, is potassium bromide, 20 to 40 grains (1.3 to 2.5 grams) at bedtime. Iodine is sometimes useful when the goiter is large or is increasing in size. When, however, it aggravates the cardiac or nervous symptoms or causes a decline in body-weight it should be abandoned. Syrup of hydriodic acid in doses of 1 dram (4 c.c.) thrice daily and iodipin locally to the gland at night are eligible preparations. Patients often seem to feel better while taking tincture of belladonna, 10 minims (0.6 c.c.) thrice daily. Digitalis and strophanthus appear to be without effect. Thyroid extract, while occasionally beneficial, is usually

⁴⁶ British Med. Jour., Oct. 28, 1905.

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harmful. Thymus gland yields negative results. Antithyroid serum, in the author's hands, has proved useless. External applications of cold are sometimes followed by diminution of swelling. Electrical treatment has proved disappointing. The risk attending thyroidectomy is regarded as being too great to justify the adoption of the operation save in exceptional cases.

G. Murray ⁴⁷ believes that *the systematic application of the faradic current*, in sufficient strength to produce a prickling sensation, is one of the most valuable means of treatment in Graves's disease. Arsenic is regarded with favor. With this he combines tincture of convallaria, 10 to 15 minims (0.6 to 1.0 c.c.) and, when nervousness is a marked feature, potassium bromide. He asserts that convallaria is far superior to digitalis or strophanthus in controlling the heart. Rodagen acted well in one case, though in large doses it apparently caused bradycardia with convulsions. Thyroidectomy is believed to be inadvisable.

S. Christens ⁴⁸ treated 18 patients with the *blood serum of thyroidectomized goats* and reports very encouraging results. K. Thienger and H. Henpel ⁴⁹ also speak favorably of this method of treatment.

G. Joussemet ⁵⁰ states that the long-continued administration of *sodium salicylate is often very serviceable in exophthalmic goiter*. One dram (4 grams) a day may often be given with advantage. The objections to the treatment, according to the author, are the possibility of injuring the kidneys—making frequent urinary examinations necessary—disturbance of digestion and the unpleasant taste of the drug.

DISEASES OF THE BLOOD

LEUKEMIA.—Ledingham and McKerron ⁵¹ report a case of *myelogenous leukemia remarkably improved by treatment with x-rays* and review the literature of the recorded cases. They find that with one or two exceptions all the patients treated with the x-rays experienced a remarkable improvement in both objective and subjective symptoms. The red cells increase rapidly to normal. The effect on the leukocytes is similar to that of an acute infection. In many cases the myelocytes have disappeared and the spleen has markedly decreased in size. The results in lymphatic leukemia have not been quite so satisfactory. The

⁴⁷ British Med. Jour., Nov. 11, 1905.

⁴⁸ Hospitastidende, 1904, No. 52.

⁴⁹ Münch. Med. Woch., 1905, No. 1.

⁵⁰ Rev. Française de Med. et de Chirurg., 1904, No. 34.

⁵¹ Lancet, Jan. 14, 1905.

writers think that the experience is still too limited fairly to estimate the true value of this method of treatment.

B. Bramwell⁵² reports a case of *spleno-medullary leukemia in which symptomatic cure resulted from the use of x-rays* and a case of lymphatic leukemia in which x-rays were employed without success.

O. Rosenbach⁵³ believes that the history of *Roentgen treatment in leukemia* is passing through the same phases as the tuberculin treatment of tuberculosis and regards the sudden suppression of an essential symptom of the disease as a questionable advantage for the organism. He thinks that in leukemia a certain number of white cells—and probably also of the red—are destroyed by the x-rays and that others are attracted to the skin by the local irritation. These processes alter the composition of the blood to a certain extent, and as the blood is the organ which supplies stimuli for the functional activity of the tissues, the production of leukocytes is inhibited for a time. It is an open question whether the radiation is itself the inhibiting factor or the direct or local action of the rays on the blood, or whether the products of the destruction of the blood cells may not be the determining factor. The inhibiting influence of the rays is probably only a temporary compensation of the actual morbid cause, just as the benefit of purely symptomatic measures to reduce fever is experienced only so long as these measures are kept up.

CHLOROSIS.—R. Lefevre⁵⁴ has collected a series of cases of chlorosis in which *favorable results were obtained by the administration of oxygen* for two weeks or a month. The appetite increased, breathlessness disappeared, menstruation returned, and the general condition showed marked improvement. The good effects of the oxygen, however, may not be permanent. The remedy is principally of value in patients who manifest severe gastric disturbance and are intolerant of iron.

SPLENIC ANEMIA.—J. O'Malley and A. O'Malley⁵⁵ state that they have collected 13 additional *splenectomies for splenic anemia* done since 1901. If these be added to Harris and Herzog's list⁵⁶ there are 32 cases with 24 recoveries—a mortality of 25 per cent. Without splenectomy or Talma's operation all die; with splenectomy about 75 per cent. recover. The statistics for Talma's operation as applied to splenic anemia are not extensive enough to warrant any conclusion.

⁵² Clinical Studies, vol. iii, 1905.

⁵³ Münch. Med. Woch., 1905, No. 22.

⁵⁴ Thèse de Lyon, 1905.

⁵⁵ Amer. Jour. Med. Sci., June, 1905.

⁵⁶ Annals of Surgery, July, 1901.

HEMOPHILIA.—Weil ⁵⁷ contends that *hemophilia* is not due to the presence of an anticoagulating body in the blood, but to the absence or modification of certain substances normally in the blood, such as the coagulating ferment, fibrin ferment, or thrombose. Hemophilic serum added to normal blood does not affect coagulation, but normal serum added to hemophilic blood causes normal coagulation; in the latter, animal serums have the same action, but are less intense. In a typical case of hemophilia, intravenous injections of beef serum (15 c.c.) had a remarkable effect in inducing coagulation in blood drawn from the finger. The curative action of the serum became evident in 48 hours and continued marked for about a week, when it gradually subsided. Too large a dose had an opposite effect. Weil concludes by recommending this method of serum treatment as a preventive measure in case operation is contemplated on a hemophiliac. In the case described the patient had a tooth pulled after an intravenous injection of the foreign serum, and, for the first time in his life, the traumatism of the operation was not followed by excessive and prolonged bleeding.

DISEASES OF THE CIRCULATORY SYSTEM

CHRONIC AFFECTIONS OF THE HEART.—H. Eichhorst ⁵⁸ regards *digitalis* as the best cardiac tonic and gives as the indication for its use weakness of the cardiac muscle, whether the latter be due to valvular disease, pericarditis, or sclerosis of the coronary arteries. With regard to valvular disease, he believes that it is a mistake to limit the use of *digitalis* to lesions of the mitral valve, since the drug acts just as well in cardiac weakness secondary to aortic valvular lesions. *Digitalis* acts on the weakened heart slowly and permanently, and therefore is of little value in acute heart failure. The full action of the drug, in his opinion, is obtained by using the leaves and not infusions, tinctures, or extracts. He usually prescribes about 1½ grains (0.1 gram) of the powdered leaf with 15 grains (1.0 gram) of diuretin and 5 grains (0.3 gram) of sugar. One such powder is taken three times a day. In his hands the dialysate of *digitalis* and the glucoside have proved disappointing. To secure the best results he finds that large doses are necessary and that it is better to err by giving a little too much than too little. He cites cases in which the drug failed to produce the desired result at the first administration, but acted when treatment was begun for a second or even a third time.

⁵⁷ Presse médicale, 1905, No. 84.

⁵⁸ Deut. Med. Woch., Jan. 2, 1905.

Eichhorst does not give digitalis at once, but puts the patient at rest and on a milk diet for two or three days. If the symptoms do not disappear then he orders the powder.

ANGINA PECTORIS.—T. Oliver⁵⁹ writes that in all cases of *angina pectoris*, whether true or false, attention should be paid to *the condition of the stomach and bowels*. Remedies must be used to check decomposition of food, to prevent flatulence, and to relieve constipation. Alcohol and tobacco should be entirely prohibited or reduced to a minimum. Oliver believes that amyl nitrite is the most useful drug. When there are signs of failing heart behind the peripheral arterial obstruction, he thinks that it is often desirable to combine digitalis or nux vomica with, for example, ethyl nitrite. Other nitrites, like nitroglycerin, are equally useful. In certain individuals in whom the arteries are so diseased that they do not respond equally over the body to amyl nitrite, this preparation and its congeners do harm. The arterial tension is already low, and as a consequence some unpleasant effects are produced. In some cases of true angina, morphin is the only drug which will afford relief. In many cases, even when there is no syphilitic taint, potassium iodide will lengthen the interval between the attacks.

ARTERIOSCLEROSIS.—E. Romberg⁶⁰ reiterates the necessity for *gentle persevering measures in arteriosclerosis*, avoiding abrupt changes in medicine or diet. Potassium iodide—five times a day in doses of $\frac{1}{2}$ to 5 grains (0.1 to 0.3 gram) for 2 or 3 years, suspended for one week in each month and one month after every three—he regards as the best medicinal remedy. He believes that it acts solely by reducing the viscosity of the blood and thus lessens the work to be done by the vascular system. It is not to be given when there is edema of the lungs or when arteriosclerosis is complicated by Graves's disease. In order to minimize gastric disturbance it can be given with sodium bicarbonate, acid foods also being withheld. For cerebral arteriosclerosis a mixture of sodium bicarbonate, sodium nitrite and potassium nitrate is recommended. He has found nitroglycerin valuable in anginal attacks, but of little value when this symptom is not present. Physiologic rest is indicated. Obesity should be reduced by diet and not by exercise. Sleep is absolutely necessary, and it may be advisable to give a hypnotic for three or four consecutive nights. Indifferent and brine baths are useful, but must not be too hot or too cold. Alcohol, tea, coffee, and tobacco, if used at all, should be

⁵⁹ Lancet, Sept. 16, 1905.

⁶⁰ Deut. med. Woch., 1905, No. 35.

used very sparingly. Abstinence from tobacco is compulsory in angina pectoris. With regard to diet, Romberg treats each case individually, according to the state of nutrition and the condition of the alimentary canal. On the whole, he recommends a mixed diet, with very little condiment and not too much meat. Plenty of fluid should be taken and sudden changes of diet avoided.

When symptoms of cardiac insufficiency are paramount, digitalis—2 grains (0.13 gram) of the powdered leaves, once or twice a day, for long periods—is recommended. Of course, it should not be given when there is actual or threatened hemorrhage. In plethoric individuals it is well to enjoin strict milk diet for five or six days, combined with the use of digitalis. In angina pectoris, Romberg considers that digitalis is indicated in slight or moderately severe cases in which cardiac weakness is obvious between the attacks. In severe cases, when the cardiac power is normal, it is useless. In cardiac asthma, especially when it occurs nightly, a narcotic with camphor or caffein is recommended, but morphin is contraindicated in angina pectoris. Here dionin may be given with nitroglycerin or sodium nitrite. When cardiac is combined with abdominal plethora, arterial tension is often raised. In such cases purgation is valuable.

When the kidneys are affected early, sudden and severe breathlessness is a conspicuous sign, the pulse tension is increased, and if the heart is feeble the amount of urine is normal or diminished. Here also the indications are general depletion and cardiac tonics. Digitalis must be used with utmost caution, but in severe cases it may even reduce, arterial tension. It is best given with diuretin. Any heart-weakening procedures, such as powerful diaphoresis or an exclusively milk diet, are to be avoided. Carbonated baths are valuable in slight attacks of heart weakness and in recovery from severe attacks. They are contraindicated after severe angina pectoris, in persistent orthopnea, in severe edema, in grave general weakness when emboli or hemorrhages are present or threaten, and in nervous or excitable subjects.

E. Hirschfeld⁶¹ praises *the systematic employment of hot baths in the treatment of arteriosclerosis*. The effect of the bath is four-fold: It alters the distribution of blood pressure by unloading the internal organs and by increasing the vascularization of the skin; hence it affords prompt relief in many cases of pain associated with internal gout, that frequent source of arteriosclerosis. It increases

⁶¹ Australasian Med. Gaz., July 20, 1905.

combustion. It increases the elimination of waste products. By opening the channels of the skin, it reduces the pressure of the blood by bleeding the patient into the skin. In every instance it is necessary to ascertain exactly the reaction of the individual. Without a vigorous left heart the hot bath must be used with caution. According to Hirschfeld, one may safely begin with a temperature of 102°F. if the patient is not above 55 or 60; in women it is safer to begin at 100°F.

DISEASES OF THE RESPIRATORY SYSTEM

CAPILLARY BRONCHITIS.—O. Heubner⁶² ascribes *life-saving value to hot mustard-water packs* in many cases of capillary bronchitis, when the breathing is much embarrassed owing to the accumulation of inflammatory products in the bronchioles. The remedy acts by drawing the blood to the skin. The technic is as follows: A pound of mustard flour is stirred into 3 pints (1.5 liters) of water at 104° F. until irritating vapors are given off. A large sheet is then saturated with the mustard solution, wrung out and spread over a woolen blanket. The entire body of the child from the neck down is rolled in the covers, which are tied about the neck and feet, so that the irritant vapor is not inhaled. In from 10 to 20 minutes (depending upon the reaction and strength of the patient) the child is taken out, when its body is found to be lobster red. A warm bath comes next and the child is then put in a second pack of lukewarm water and left for from 1 to 2 hours, if possible, in order to maintain the hyperemia of the skin. While in the second pack, the temperature is liable to rise, and the child, therefore, should be under constant supervision, in order to interrupt the procedure if its head and face become red or as soon as it sweats freely. A second warm bath is then given, and in case the child is very hot, cold water may be quickly poured over it. This ends the procedure for the day. Within twenty-four or forty-eight hours there is often rapid convalescence. Frequently, however, the baths must be repeated on the second or third day. Where the baths are not successful in reddening the whole surface the treatment should be discontinued. Schopohl⁶³ also speaks favorably of *warm baths in capillary bronchitis*.

ASTHMA.—A. Morison⁶⁴ recommends *rhythmic compression of the thorax in attacks of asthma*. With one hand on the back and the other on the front, the chest is emptied at the end of each inspiration. After

⁶²Therap. der Gegenwart, xlv, No. 1, 1905.

⁶³Blätt. f. klin. Hydrotherap., 1905, No. 4.

⁶⁴Lancet, Nov. 25, 1905.

several maneuvers of this kind relief is given. Even in old persons with stiffened chests, Morison has found compression by one hand over the thorax and the other over the epigastrium, the lower ribs, or preferably over the right hypochondrio-epigastric region, to afford relief.

Kaplan⁶⁵ believes that *adrenalin, administered subcutaneously*, is the most efficient remedy that we possess in relieving the paroxysms of asthma.

HAY FEVER.—O. J. Stein⁶⁶ reports 36 cases of hay fever treated with *Dunbar's antitoxin*. Regarding the remedy as a prophylactic, he found that in all but a few cases it proved efficient. When used during the height of an attack it usually modified the severity of the symptoms, but never entirely relieved the patient. Occasionally when the disorder was fully established the drug was wholly without effect.

PNEUMONIA.—H. A. Hare⁶⁷ writes that the cardiac stimulants which seem to do the most good in toxemic cases of pneumonia are Hoffmann's anodyne and aromatic spirit of ammonia. Digitalis, he thinks, is rarely as valuable at such times. Strychnin he regards as a whip which should be used to pull the patient out of a critical period. Its constant use day after day deprives the physician of this whip, which he may need, should a crisis arise. Nitroglycerin should not be employed when there is vascular relaxation. When the skin is hot and dry, when the kidneys are inactive, and the arterial tension is high, nitroglycerin or spirit of nitrous ether is often valuable. When the first sound of the heart lacks tone, and the pulmonary second sound is accentuated, it is his habit to administer 5 minims (0.3 c.c.) of the tincture of digitalis every four or eight hours, and every two or four hours to give 10 minims (0.6 c.c.) of the tincture of belladonna, the latter, because of its fleeting effects, being given twice as often as the digitalis. When the circulatory condition is urgent and the pulse above 100, this treatment, aided by the administration of Hoffmann's anodyne by the mouth and camphorated oil hypodermically, will often pull a patient through when other methods fail. The value of oxygen is debatable. It sometimes gives comfort to the patient's friends and sometimes to the patient himself. In cases in which the kidneys are fairly active and not diseased, and in which restlessness and delirium deprive the patient of sleep, Hare believes that morphin hypodermically may save life, for often several hours of quiet sleep will so refresh a

⁶⁵ Medical News.

⁶⁶ Chicago Med. Recorder, March 15, 1905.

⁶⁷ Therap. Gazette, June, 1905.

patient that the whole complexion of the case is different upon his awakening.

The conclusion of E. De Renzi's,⁶⁸ from an experience with *Pane's antipneumococcic serum* in the treatment of 26 cases of pneumonia, is that the general condition always improves under serumtherapy.

PLEURISY.—S. West⁶⁹ makes the following suggestions regarding *operative interference in pleurisy with effusion*. When the pleura is filled with fluid and respiratory movements are abolished, paracentesis should be performed at once. A small effusion should be tapped if it has existed for some time and exhibits no tendency to disappear. Immediate paracentesis is indicated when dyspnea sets in suddenly and rapidly becomes urgent. Siphonage constitutes the best means of evacuating the pleura. For this purpose an ordinary trochar and cannula, connected with a rubber tube reaching to the floor, can be employed. The free end of the tube should be immersed in sterile water to avoid aspiration of air. The negative pressure thus established is sufficient to permit the escape of as much fluid as can be safely removed. The use of the aspirator is unnecessary. Paracentesis may be repeated if the fluid reaccumulates. Free incision of the chest is rarely indicated in serous pleurisy; it necessarily leads to empyema, but this may be more readily cured than the recurrent effusion. The operation should be performed only when the lung is free from adhesions and capable of expanding readily. In empyema the pus should be evacuated immediately. Ordinarily, incision and drainage will be required. In making the incision a needle should first be introduced and if pus be found the needle should be used as a director. Generally, the preferable site for incision is just in front of the postaxillary border on a level with the nipple. Resection of a rib should be practiced only when necessary to provide free drainage. An oval opening may be made between the ribs and two small drainage tubes introduced. When the pus is curdy, flaky, or offensive, or if it contains blood clots, recovery will be greatly accelerated by irrigation.

H. Plank and P. Steele⁷⁰ report 2 cases of *pleurisy with recurring effusion successfully treated by injections of adrenalin into the pleural sac*. This treatment was first recommended by J. Barr⁷¹ of Liverpool. As much as possible of the fluid was withdrawn by a two-way trochar and cannula, and through the cannula, still *in situ*, 1 dram (4 c.c.) of

⁶⁸ *Rif. Medica*, No. 20, 1905.

⁶⁹ *Lancet*, March 25, 1905.

⁷⁰ *British Med. Jour.*, July 15, 1905.

⁷¹ *British Med. Jour.*, March 19, 1904.

adrenalin choride (1 to 1000), diluted to $\frac{1}{2}$ ounce (15 c.c.) of sterile, water, was introduced by means of an exploring syringe. The cannula was then removed and the wound closed with wool and collodion. Chauffard and Bodin ⁷² speak very highly of *dechloridation* in cases of pleurisy with effusion. They experimented with a mixed diet lacking in chlorides and with a strict milk diet. The former was not well borne, but the latter, since it produces free diuresis and promotes the chloric crisis accompanying the natural cure of the disease, was found to result most favorably.

Hecht ⁷³ has used a 10 per cent. ointment of *guaiacol and salicylic acid* with good results in cases of pleurisy with effusion, many of them probably tuberculous. In early cases he states that the fluid may be absorbed in from five to nine days. If the ointment caused marked irritation of the skin, a new area should be selected for each application.

DISEASES OF THE URINARY SYSTEM

NEPHRITIS.—Jackson ⁷⁴ writes as follows concerning *the diet in nephritis*. The diet must be devoid of all irritating substances, as pepper, mustard and similar condiments. Recent studies, have shown experimentally that salt is excreted with difficulty by the diseased kidney, and that its withdrawal often has a marked effect upon the amount of edema. Rich meat broths are to be forbidden. The kind of meat chosen is not of importance, provided the variety decided upon agrees with the individual. Recent investigations of von Noorden and others have shown that chemically red meats do not differ essentially from white meats. The exact chemical researches, therefore of recent investigators show the wisdom of many clinicians who have for years advocated the careful use of meat in nephritis, irrespective of the color of the meat. The great nutritive value of fats must always be remembered, and our patients induced to eat as much fresh butter and cream as their digestion warrants. The diet must be limited to the quantity required to maintain so far as may be a proper equilibrium. All excess is to be avoided.

Widal and Javal ⁷⁵ summarize their extensive studies on *diet in nephritis* as follows: chlorides and urea may be retained in the organism together or separately in the course of Bright's disease. These two

⁷² Gaz. des hopitaux, 1904, No. 51.

⁷³ Münch. med. Woch., 1905, No. 9.

⁷⁴ Boston Med. and Surg. Jour., April 6, 1905.

⁷⁵ Semaine Méd., 1905, No. 27.

kinds of retention offer entirely different indications for dietetic treatment. Deprivation of salt is effectual in combating the water-accumulating effects of retention of the chlorides. When nitrogenous bodies are accumulating in the blood, ingestion of albuminoids should be reduced. The administration of 100 to 150 grams of lactose aids in nourishing the patient while it does not favor the development of toxic substances, and with abundance of water is liable to banish attacks of eclampsia and edema. Local or general venesection is a valuable aid in this disease, and it allows surveillance of the proportion of urea in the blood which should be systematically determined; as a rule, the amount of albumin allowed should be moderate but sufficient. Milk is not so innocent as generally supposed, for 3.5 liters contain about 120 gm. of albumin, that is more than the normal man has need of. Milk supplies also too much water for certain cases. It must not be forgotten that the nitrogen of the food, whether from meat, vegetables, or milk, leads to the production of urea. Milk owes its value in kidney disease to the lack of salt, and Widal's experience has demonstrated that it can be advantageously replaced by substituting for 3 liters of milk, 400 grams of meat and 500 grams of bread, without salt, or a milk-vegetable diet which is much more appetizing. Meat in itself is not injurious in kidney disease. As a rule, from 100 to 200 grams of meat will be found sufficient to supply the necessary albuminoids while imparting variety to the diet. An excess of salt should always be avoided in the diet as a precautionary measure, and likewise an excess of albumin, as one never knows when accumulation and retention may be impending.

J. L. Miller ⁷⁶ draws the following conclusions from a study of *chloride elimination in nephritis*. In patients with moderately severe nephritis associated with edema, the ingestion of large amounts of sodium chloride is followed by chloride retention. The patient gains in weight, the edema becomes more marked, the albuminuria increases and symptoms may develop resembling uremia. In patients with severe nephritis, and especially those with uremia, chloride retention is very marked, as scarcely any of the extra chlorides administered are eliminated. In individuals with apparently healthy kidneys following the ingestion of sodium chloride, there is a chloride retention equal to that of mild nephritis. The individual gains in weight, but there is no visible edema, no albuminuria and no uremic symptoms appear.

⁷⁶ Jour. Amer. Med. Assoc., Dec. 23, 1905.

G. Zambelli and R. Massalonge⁷⁷ also believe that a *chloride-free diet* may be instituted with great benefit in nephritis with edema.

In contrasting the *action of the four diuretics*—theocin, caffein, theobromin, and agurin—E. Clerici⁷⁸ says that caffein alone has a direct action on the heart as well as the kidneys, the other three have distinctly a renal action. Caffein raises the blood tension; agurin and theobromin lower it; and theocin lowers it most of all. Agurin and theobromin have a moderating action on the pulse and respiration; theocin and caffein tend to increase the pulse rate. All four have much the same diuretic effect, influencing transudates much more than exudates. They do not irritate the kidneys, but rather tend to diminish the pathologic constituents of the urine. In using these drugs Clerici advises that in Bright's disease, with disorganized kidneys and weak heart, caffein is best; in chronic granular kidney with high arterial tension, agurin and theocin are to be preferred; in mitral disease the four remedies are equally indicated; in cases of inflammatory exudation and atrophic cirrhosis of the liver these four drugs are all useless. From experience with *lumbar puncture in 10 cases of uremia*, R. Willson⁷⁹ concludes that this procedure should be employed as a routine measure in all cases. He has found it especially useful in cases without edema but with high intravascular tension. He is of the opinion that transfusion of salt solution is harmful in uremia, in that it causes, both by its mechanical and chemical influence, an increase of intravascular and intracranial tension, and supplies certain of the conditions necessary to the uremic seizure.

DISEASES OF THE DIGESTIVE SYSTEM

TONSILLITIS.—St. Clair Thomson⁸⁰ calls attention to the fact that a *quinsy*, or an acute collection of pus in the faucial region never forms in the tonsil itself, but always in the peritonsillar areolar tissue between the tonsil and the pharyngeal aponeurosis. In over 90 per cent. of the cases the abscess is above and in front of the tonsil. If an imaginary horizontal line be drawn across the base of the uvula, and another vertically along the anterior faucial pillar, they will intersect at a point overlying the supratonsillar fossa. Just external to this point will be found the best point for opening a quinsy. The abscess is best reached by means of Lister's sinus forceps. In most

⁷⁷ Wien. Klin. Therap. Woch., 1904, No. 50.

⁷⁸ Riv. Crit. di Clin. Med., 1905, No. 2.

⁷⁹ Jour. Amer. Med. Assoc., July 1, 1905.

⁸⁰ British Med. Jour., March 25, 1905.

cases the patient can only open the mouth slightly, and inspection is greatly facilitated by the use of a frontal mirror. The field of operation is cleansed and sprayed with cocain solution (5 per cent.), and the patient's head steadied by an assistant. If the surgeon is uncertain as to the presence or exact position of the pus, it is easy to feel the region with end of the forceps. When this encounters a resistant cartilage-like tissue he should "tap" onward until the sensation of a boggy surface is reached—in the area above indicated. It is then sufficient to push the forceps backward, with a slight inclination outward, in order to reach the pus. As the forceps are withdrawn the blades should be opened widely, so as to produce a vertical opening through which the pus pours into the mouth.

HEMATEMESIS AND ENTERORRHAGIA.—Capitan⁸¹ considers *calcium chloride* the most useful drug in these conditions. Two intestinal irrigations per day of a quart of water each at 118° (F.), to which one dram (4 grams) of calcium chloride has been added, are given. At the same time the patient is given 30 grains (2 grams) of this substance in aqueous solution by the mouth. The irrigation must be given gently, slowly, and under low pressure. Four or five small doses of opium by the mouth complete the treatment.

HYPERCHLORHYDRIA.—A. Albu⁸² recommends a *diet that is largely vegetable* in this condition, because although albumin combines with hydrochloric acid, it also increases its secretion. The food must be well cooked and finely divided, if necessary, by putting through a sieve. Starchy foods are well tolerated if made of the finest meal from which the gluten has been practically removed. Fine wheat bread is to be preferred. While coarse vegetables are to be excluded, fine purées, such as spinach or cauliflower, are harmless. Albuminous foods may be taken with the exception of some fatty forms, such as goose, pork, eel, etc. The only fats of value are unsalted butter, milk, cream, and egg fat, because they are so easily emulsified. On account of the favorable action of fats, he recommends from 1 to 2 tablespoonfuls of olive oil from one to two hours after the principal meals. Cane sugar is rarely well borne. Acid foods, gravies, spices, alcohol, and other irritants must be excluded. Chocolate or weak tea may be given if they seem to agree. Small meals at frequent intervals are best in order to combine quickly with the excess of acid. It is also advisable to eat a little before retiring or on waking, to prevent faintness. In stubborn cases lavage is the best treatment, especially late in the

⁸¹ La Médecine Moderne, 1905, No. 10.

⁸² Therap. der Gegenwart, 1905, No. 40.

evening, about three hours after the last meal, so as to give an undisturbed night's rest, or, if this is impracticable, in the morning on an empty stomach. The author recommends lavage with water holding in suspension a mixture of magnesia and sodium bicarbonate. To restrain the production of acid he recommends a combination of an alkali with belladonna.

GASTRIC ULCER.—E. Wirsing⁸³ reports *comparative trials of the Lenhartz and von Leube-Ziemssen dietetic treatments of gastric ulcer*. He found the Lenhartz technic distinctly superior to others in cases of ulcer with hemorrhage. It supplies more nourishment, and although it irritates the ulcer more than other treatments the advantages of more nourishment for the subjects debilitated by hemorrhage, outbalance the local action on the ulcer. On the other hand, the von Leube-Ziemssen treatment gave much better results in cases without hemorrhage and consequent anemia. Wirsing's studies are based upon 320 cases. The Lenhartz method was followed in 42, in half of which hemorrhage had been observed. The patients were given two raw whipped eggs and 20 c.c. of milk the first day, ice cold, increasing daily by one egg and 100 c.c. of milk until they were taking 8 eggs and one liter of milk during the twenty-four hours. After the sixth day chopped meat, butter, etc., were allowed in progressive amounts. Ice was applied to the stomach during the first seven to ten days in cases of hemorrhage, and from 1 to 2 grams of bismuth were given three times a day, sometimes with the extract of belladonna. When there were no further pains, a solution of albuminate of iron was administered, with Fowler's solution in case of severe anemia. The patients were kept in bed for from two to four weeks. Only a few patients found this diet disagreeable, necessitating the use of albumin in another form. The acidity approximated normal in the course of this treatment and all patients gained in weight.

W. J. Mayo⁸⁴ states that in 14 years he and C. H. Mayo have *operated in 384 cases of gastric ulcer and 84 cases of duodenal ulcer*. He does not advise operation in any case of acute ulcer, although certain complications such as perforation, hemorrhage, and grave obstruction may compel its speedy performance. He does not advise operation in chronic ulcer or its associated diseases until careful and prolonged medical treatment has failed to cure permanently, and strongly advises against operation in neurotic individuals with prolapse of the stomach. He advises operation in all cases of stagnation

⁸³ Archiv. f. Verdauungs-Krankheit., 1905, No. 8.

⁸⁴ Jour. Amer. Med. Assoc., Oct. 21, 1905.

and retention of food depending upon mechanical causes, such as pyloric obstruction, and in cases of exhausting hemorrhages. He advises operation in that considerable group of chronic cases with acute exacerbations, in whom frequent relapses with their attendant disabilities prevent the patient from the enjoyment of good health. It is this latter group, he writes, that reminds him forcibly of the early days of appendicitis in which great divergence of opinion was made manifest, from the practitioner who rarely saw a case to the equally honest man who saw them frequently but always cured them without trouble.

GASTRIC CANCER.—H. Matti⁸⁵ of Kocher's clinic, reports the results in 101 cases of *resection of the stomach for gastric cancer*. He advocates resection with gastroduodenostomy. The mortality from local complication was only 8 per cent. of 75 operations between 1881 and 1904, and only 4.6 per cent. in 43 operations in the last six years. About 71.8 per cent. of 71 patients traced to date died after an interval of five months to six years, but 20 patients, a proportion of 28.2 per cent., are still living. The average survival was 18.7 months, and the family frequently stated that patient was free from all gastric disturbance until the end. Of the 20 surviving patients, 1 is in good health after 16 years, and 6 others after from 1 to 5 years. Recurrence in the cicatrix was observed in only one instance.

DIARRHEA IN CHILDREN.—Winters⁸⁶ gives the following advice as to the *feeding in neglected cases of diarrhea in infants* from 3 to 10 months of age. With profound apprehension of the evil effects from the prolonged use of condensed milk, he prescribes it as the only food, except breast milk, that will save life. The fact that infants who have been continuously fed on condensed milk have an abiding predisposition to diarrhea does not deter him from having recourse to it in the restricted manner indicated. He directs as follows: For a baby 3 months of age with subacute or chronic diarrhea, take one teaspoon level full of canned condensed milk (scrape off the under surface of the spoon, put it into a bowl, add twenty-four teaspoonfuls of water which is actually boiling. One ounce of this should be used for each feeding. (The rest to be thrown away. Prepare fresh for each feeding.) After cooling to a temperature for feeding, add two teaspoonfuls of lime-water to one ounce of the mixture, and give this quantity (one ounce and two teaspoonfuls) every four hours. This should alternate with one ounce of hot water and two teaspoonfuls of lime-water every

⁸⁵ Deutsch. Zeitschrift f. Chirurg., 1905, Nos. 1-3.

⁸⁶ Medical News, July 15, 1905.

four hours (water and food alternating every two hours). At the end of twenty-four the stools become less frequent and improve in character. After forty-eight hours, if improvement has progressed, the quantity may be increased to two ounces every four hours, with one-half ounce of lime-water added. Alternate this with 2 ounces of hot water and one-half ounce of lime-water. After forty-eight hours of this management, if the movements are normal, two ounces of the condensed milk mixture, with one-half ounce of lime-water, should be given every two hours, and the water discontinued. One week later, everything being normal, the food is strengthened by making it one teaspoonful to sixteen, or two to thirty-two, of boiling water. Give three ounces of this mixture, with one-half ounce of lime-water, every three hours. This strength is not exceeded—one to sixteen—at any period.

The effect of this feeding is said to be so miraculous in infants apparently hopelessly ill that it is difficult to induce mothers to discontinue it. The responsibility of the physician is great. The condensed milk must be stopped, or that which saved the child's life will later lead to scurvy or rickets. With the advent of propitious weather, if everything is favorable, condensed milk should be supplemented gradually, surreptitiously as follows: Take the top ounce from a quart bottle of milk, which has been standing upright on ice for sixteen hours from the time of milking, or in town six hours after it has been received in the nursery. Keep this one ounce of cream on ice until it is needed. One teaspoonful of this cream is added to every second bottle of the condensed milk food, just before feeding. After three days of this feeding if the stools are normal, and the appetite is good, one teaspoonful of cream is added to every bottle. One week later, two teaspoonfuls of cream are added to every bottle. After continuing this feeding two weeks the condensed milk is gradually lessened, the top cream gradually increased. It now becomes important to take more from the top of each quart bottle of milk, in order that there may be a slowly increasing percentage of proteid in the food.

In subacute and chronic diarrhea in the second year, with cereals as the only food, every case comes under control in a surprisingly short period. In a bottle-fed child, whole barley gruel, four to six ounce every four hours—five feedings in the twenty-four hours—is recommended. Cold, unboiled water is allowed freely. To supplement the action of castor oil it is sometimes expedient to irrigate the

bowel on the first day. Repeated irrigations are exhausting and seldom advisable.

E. M. Sill⁸⁷ summarizes his views regarding the *treatment of summer diarrhea in children*: First, absolute rest for the inflamed mucous membrane of the stomach and bowel, attained by stopping all food and giving nothing but water; second, elimination of the cause—namely, a foreign substance which is causing irritation, as fermenting or indigestible food, this being done by the use of castor oil or calomel; third, success lies in the mode of gradually increasing the strength and quality of the milk, beginning in all cases irrespective of the age up to a year, with a very weak cream mixture.

DYSENTERY.—N. Faichnie⁸⁸ lays down the following rules for the *treatment of bacillary dysentery*. Rest and equable temperature are essential. For acute cases the best treatment is that by sodium or magnesium sulphate; this should be given in as concentrated form as possible, and lukewarm. At first dram doses may be given every hour till the stools contain fecal matter, and the interval between the doses may be increased. When there is no more blood or mucus, mercury perchloride in 45 minim (3.0 c.c.) doses with tincture of chloroform and morphin every four hours should be substituted. Bismuth and opium, and sulphur and opium are also useful at this stage to stop diarrhea. When there is much tenesmus a starch-and-opium enema gives relief. The earlier the treatment by the sulphates the more chance is there of its being successful. In chronic cases the sulphates are of little use. A dose of castor oil may be given occasionally, followed by bismuth or sulphur and opium; if hemorrhage is severe, oil of turpentine is sometimes useful. In chronic dysentery local treatment is most effective. A soft rubber tube should be inserted for 20 inches into the rectum, cocain ointment having first been employed to the anus. A solution of sodium bicarbonate, 60 grains (4 grams) to the pint (500 c.c.), followed by 2 or 3 pints (1.0 to 1.5 L.) of tincture of iodine solution once or twice a day, gives beneficial results. All food should be given lukewarm. In mild cases milk may be suitable, in severe cases whey or albumin-water is far preferable.

MEMBRANOUS COLITIS.—W. Hale White⁸⁹ reports the history of 60 cases of this disease which have come under his observation. Fifty-

⁸⁷ New York Med. Jour., Aug. 5, 1905.

⁸⁸ British Med. Jour., Aug. 12 1905.

⁸⁹ Lancet, Oct. 28, 1905.

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one patients were women and 9 were men. Forty-nine cases occurred between the ages of 20 and 50. Eight of the cases proved fatal; in 16 complete recovery did not take place; in 6 there was marked improvement, and in 21 there was complete recovery. Great stress is laid on the association of membranous colitis with disorders of the female generative organs. In about 41 per cent. of the female patients this association existed. White says that by far the most important part of the treatment is to keep the large bowel empty. The simplest way to do this is by aperients and in many cases castor oil by the mouth will effect a cure. The best time to give this is in the early morning as soon as the patient awakes; then the bowels are comfortably opened after breakfast. Many persons wake an hour or two before they get up, so the oil should be taken then. Between half an ounce and an ounce (15.0 to 30.0 c.c.) is usually required. If the disease has lasted sometime, many weeks, often twelve or sixteen, may be needed before improvement is observed. The treatment should never be given up until a long trial has been allowed for it, and in all cases it should be continued for some months after apparent recovery. A minority of patients, however, are so nauseated by the oil that they cannot take it; in such cases magnesium sulphate should be tried instead, or if this be found unsuitable, calomel should be given over night. Should these methods fail the large bowel should be kept empty by washing out with plain water at a temperature of 100° F., a pint or more being used at a time. Operation should not be resorted to except in desperate cases.

MEDICINE

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INFECTIOUS DISEASES

TUBERCULOSIS.—The medical literature of the past year contains many interesting articles on the best methods of prophylaxis against tuberculosis and numerous reports of the excellent results obtained in the sanitarium treatment of the disease. Careful pathologic studies have been made of the modes of primary infection and the early changes resulting from the entrance of the tubercle bacilli into the body. A third series of articles has considered the comparative pathology of the disease and the important question of the production of immunity to tuberculosis in animals.

Von Behring's¹ statements have aroused the interest of the public, but he has not demonstrated to the medical profession his method of producing *passive immunity against tuberculosis*. He believes that his method will protect individuals threatened with phthisis against the damaging consequences of the infection. A. C. Klebs² has given a critical commentary on von Behring's recent claims. The method is based upon the use of certain harmless constituents of the tubercle bacilli for protective and curative purposes. He claims to have isolated from the tubercle bacillus a well-defined constituent called "TC," or tubercle antigens. This "TC" is formative, assimilative, and constitutes the life principle of the tubercle bacillus. By the impregnation of the living body cells with this "TC" the curative principle becomes active. The cells transform the "TC," and simultaneously body immunity

¹ Münch. med. Woch., No. 43, 1905.

² Jour. Amer. Med. Assoc., Dec. 16, 1905.

is manifested. The "TC" produces tubercles which never caseate or soften, but heal spontaneously (Laënnec's *granulations tuberculeuses*). The new curative principle is said to play the essential role in the immunizing action of von Behring's "bovo-vaccine." The bovine vaccination method consists in inoculating cattle with increasing doses of human or otherwise attenuated varieties of tubercle bacilli until an immunity against virulent bovine tubercle bacilli is established. The usefulness of his new treatment is, of course, problematic until proved. L. Pearson and S. H. Gilliland³ have tested the effect of the *intravenous vaccination* with increasing doses of human tubercle bacilli in six calves already infected with tuberculosis. At the autopsies it was shown that the treatment had a distinct curative effect as compared with the control animals.

M.⁴P. Ravenel⁴ after a critical study of the *various forms of tuberculosis* concludes: That the division of mammalian tubercle bacilli into two types, human and bovine, has been amply confirmed. These types have cultural, morphologic, and tinctorial characteristics by which they may be usually recognized. The bovine type has very much greater pathogenic power, but bovine bacilli are met which have low pathogenic power. Other species of mammals suffering from tuberculosis derive their infection from man or cattle. A third type of mammalian tuberculosis is not justified. The bovine bacillus has the power of invading the human body and producing the lesions of tuberculosis. We are at present unable to determine the exact proportion of cases in which bovine tuberculosis is transmitted to man. He reviews a number of cases in which the bovine type of tubercle bacillus has been isolated from the mesenteric glands of children. Cheinisse,⁵ in a summary of the proceedings of the Paris meeting of the International Congress of Tuberculosis, says that it has not added to our knowledge of tuberculosis, except possibly in the authoritative denial of Koch's assertions in regard to the duality of human and bovine tuberculosis.

The *frequency of tuberculous lesions at autopsies* has been investigated by several observers. The studies of F. Harbitz⁶ and W. P. S. Branson⁷ were especially thorough and their results are in close accord. Harbitz found tuberculosis in 42.5 per cent. of the autopsies per-

³ Univ. of Pa. Med. Bull., April, 1905.

⁴ Amer. Med., Dec. 9, 1905.

⁵ Semaine medicale, No. 41, Oct. 11, 1905.

⁶ Jour. Infec. Dis., vol. vii, No. 2, 1905.

⁷ British Med. Jour., April 22, 1905.

formed on children (under 15 years). Especially careful macroscopic and microscopic examinations of the lymph-nodes were made. In 18 children without evidences of tuberculous lesions the presence of tubercle bacilli in the lymph-nodes was demonstrated by the inoculation of guinea-pigs. He considers it plausible that latent bacilli frequently are less virulent and that a latency of several months may occur. The conclusion is reached that intrauterine infection is of greater importance than is generally supposed but is less frequent than claimed by Baumgarten. In 117 autopsies the disease was primary in the respiratory tract (including the tracheo-bronchial glands) in 41 per cent.; in the digestive tract (including the tonsils, cervical, and abdominal lymph nodes) in 22 per cent. Harbitz is of the opinion that greater stress must be laid upon primary infection through the digestive tract and the throat. He concludes that pulmonary tuberculosis is often secondary to primary foci in other organs, especially the lymph nodes, the infection of the lungs occurring most likely by way of the blood. In 43 cases of tuberculosis in children Branson found the primary lesions in the bronchial glands or lungs in 22 per cent., and in the intestines or mesenteric glands in 20.9 per cent. Branson investigated the relation of whooping-cough and measles to tuberculosis and concluded after a careful study of the subject that: There is no specific relation between measles and whooping-cough on the one hand and tuberculosis on the other, but that catarrhal lesions of the mucous membranes are the paramount predisposing causes of tuberculosis in early life. Such careful and detailed studies as those of the above observers cannot fail to be of value; at the same time, the recent views of Baumgarten^{*} seem to be sound and conservative. He believes that we cannot with certainty determine the route followed by the tubercle bacillus in infecting the body. The study of the localization, extent, and arrangement of the tuberculous lesions may render this or that route more probable. All routes should be considered possible and prophylactic measures should be directed against infection from inhalation or from feeding, and congenital transmission should be considered as well as all other possible sources of infection.

The best method for the *early diagnosis of pulmonary tuberculosis* is an accurate and systematic physical examination of the patient. Special physical signs, significant symptoms, and certain clinical laboratory methods may aid in the diagnosis. A. C. Klebs, J. H.

^{*} Berl. klin. Woch., vol. xlii, No. 42, 1905.

Musser, F. Billings, J. C. Wilson, and H. R. M. Landis⁹ in their report on the early diagnosis of tuberculosis, call attention to the importance of the recognition of the pulmonary lesion in the closed stage, before bacilli are found in the sputum. Among the symptoms, atypical hemoptysis, poor nutrition, and slight afternoon rise of temperature are very significant. The rise of temperature may appear only after exercise, or in women before and during menstruation. The earliest auscultatory sign is the rough and slightly diminished respiratory murmur. Rales which can be heard in the morning or on damp days may be absent during the afternoon and in dry weather. A pleuritic friction sound is often heard near the axillary line between the sixth and eighth ribs. Tuberculin is an important diagnostic method, but great care is necessary in its application. O. Roepke¹⁰ considers painful impaired resonance in the interscapular region of great importance for the early diagnosis of tuberculosis of the tracheal and bronchial glands. A. Friedlander¹¹ considers radioscopy of value in the diagnosis of enlarged bronchial glands. Lymphocytosis was observed in his cases.

TYPHOID FEVER.—The problem of *immunity in typhoid fever* has been summarized by J. Ewing.¹² Typhoid fever is considered to be a combined specific bacterial intoxication and a somewhat peculiar form of self-intoxication. A bactericidal serum may possibly be of some value early in the disease if the bactericidal power of the blood is deficient. Later when the bactericidal power of the blood is usually high, and the patient is suffering from the effects of bacterial toxins and from poisonous products of self-intoxication, the serum may prove a dangerous agent. The prevention of the disease by active immunization as instituted by Wright has a much better theoretical foundation and the practical results seem to be fairly encouraging, although it is difficult to estimate the exact benefit of the treatment.

Edsall¹³ calls attention to the *harm that may result from the use of impure milk during the course of typhoid fever*. It seems highly probable that bad milk often exerts injurious effects on patients ill with acute infectious diseases. Many typhoid patients in the ward were very ill with abdominal symptoms; the milk was then pasteurized and of 92 subsequent typhoid fever patients fed with pasteurized milk only 4

⁹ Boston Med. and Surg. Jour., June 1, 1905.

¹⁰ Beiträge z. klin. d. Tuberc., vol. i, p. 180.

¹¹ Jour. Amer. Med. Assoc., Jan. 7, 1905.

¹² New York Med. Jour., Oct. 14, 1905.

¹³ New York Med. Jour., March 25, 1905.

developed diarrhea while under treatment. Eight patients had diarrhea on admission, but in 5 the trouble subsided within three or four days after admission to the hospital. The important points are: (1) Pure milk is the best diet for most cases of infectious diseases; (2) the use of infected milk may be very harmful and the ill effect be rendered obscure by other factors that are present.

Several important articles on *intestinal perforation in typhoid fever* have appeared during the past year. The conclusions of R. H. Harte¹⁵ and J. A. Scott¹⁶ are based upon a careful study of a series of cases and the signs of perforation are fully considered. Perforation is the cause of death in about one-third of the fatal cases of typhoid fever and occurs most frequently between the fourteenth and twenty-first days of the disease. Perforation occurs in cases of all grades of severity. The most frequent site of the perforation is the ileum; the appendix and colon are the next most frequent sites. Pain is present in about 75 per cent. of the cases; it may be transitory, and in about 20 per cent. of the cases is slow in onset and not localized. In 50 per cent. of the cases the onset of the pain is sudden and severe and increases in intensity, localizing itself in the right iliac region. Tenderness and rigidity are usually present. Rigidity is a very valuable sign, but may be absent in cases with pendulous and relaxed abdominal walls. The temperature should be taken hourly when perforation is suspected, so that the immediate rise and slow fall to normal or sub-normal which often occurs can be detected. In some cases, especially those that are very toxic, a noteworthy change in temperature, pulse and respiration may fail to appear with perforation. Distension is a late symptom of perforation, and the obliteration of the liver dullness is an unreliable sign. The study of the leukocytes is of very slight aid in the diagnosis of perforation.

PNEUMONIA.—The continued high death rate and large number of cases of pneumonia occurring in almost epidemic form in the large cities has excited public alarm and led to systematic study of the disease. The Medical Commission for the Investigation of Acute Respiratory Diseases¹⁷ has concentrated its attention upon the *bacteriologic and clinical aspects of pneumonia*. The extensive investigations so far reported have dealt principally with the pathogenesis of lobar pneumonia, and have added but little of value in the diagnosis and treatment of the disease. Numerous studies of the relation of

¹⁵ Jour. Amer. Med. Assoc., Oct. 28, 1905.

¹⁶ Univ. of Pa. Med. Bull., April and May, 1905.

¹⁷ Jour. Exper. Med., Aug., 1905.

the microorganisms found in the pulmonary secretions of individuals in health, during disease, and after death or recovery from acute respiratory diseases were made. The studies seem to show that prophylaxis will be extremely difficult.

Wood's¹⁸ experiments show that the pneumococcus lives for a considerable time in moist, and for a long time in masses of dried, sputum, but is not disseminated unless the masses become mechanically pulverized. The secretions expelled when a person suffering from a pneumococcic infection coughs, sneezes, expectorates, or talks, may contain virulent pneumococci. The bacteria in the powdered sputum die within from one to four hours and those expelled by coughing, sneezing, etc., become harmless in a shorter period of time. "In the light of these experiments the risk of infection from the pneumococcus is largely confined to those in direct contact with the person whose excreta contain the organism." The bacilli die off rapidly under the action of sunlight or diffuse daylight and desiccation. The danger of infection from powdered sputum may be avoided by ample illumination and ventilation of the sick-room and by avoidance of dry sweeping or dusting. The last-mentioned suggestions are undoubtedly very important, but it is questionable whether bacteriologic studies sufficiently indicate the extent to which the surroundings of a patient may become infected and may for a considerable time remain infected. Clinical observation indicates that this may be of much moment, and when fairly well-established clinical facts conflict with bacteriologic studies it is probable, as a rule, that this is due to imperfections in present-day bacteriology.

In 91 per cent. or 175 cases of croupous pneumonia E. C. Rosenow¹⁹ isolated the *pneumococcus* from the circulating blood. Positive cultures were obtained as early as 12 hours after the chill, and in some cases 48 hours after the crisis, but cultures taken after the crisis were usually sterile. Preble has found pneumococci in the circulating blood of patients running a typical pneumonic course, although no signs of consolidation were found. It seems that in the majority of cases the pneumococci gain entrance to the blood and set up a general infection. Rosenow concludes that the leukocyte count is unreliable as to prognosis, but, other things being equal, a high leukocyte count is favorable. The pneumococcus produces an acid reaction when grown on pneumococcic serum, and observers have reported a diminished alkalinity of the blood and an acid reaction in patients dying from

¹⁸ Ibid.

¹⁹ Jour. Amer. Med. Assoc., March 16, 1905.

pneumonia. These facts have suggested the possibility that some of the symptoms of pneumonia may be due to an acid intoxication, and has led to the trial of alkalies in the treatment of the disease.

INFLUENZA.—Influenza has not occurred in *severe epidemic form* during the past twelve months, but a number of deaths from influenza have been reported in every large city. Allbutt²⁰ believes that an acute attack usually confers an *immunity* from subsequent attacks for a period of at least five or six months. He believes that the nervous mechanism of the heart, rather than the muscle-fibers, are affected by the disease. The heart may be seriously affected, clinically, and at autopsy only very slight changes be found. Great diagnostic importance is placed upon the sudden onset and marked prostration of the disease, as contrasted with the creeping course of an ordinary cold.

The *important etiologic role played by the influenza bacillus in subacute and chronic affections of the respiratory tract* has been strikingly shown by the bacteriologic observations of T. R. Boggs²¹ and F. T. Lord.²² The latter²³ has previously demonstrated the presence of the influenza bacillus in about 30 per cent. of 100 unselected cases of acute and chronic bronchitis occurring in Boston during a time when the city was free from an epidemic of influenza. Many of the cases clinically closely resembled tuberculosis, and both writers call attention to the possibility of mistaking cases of chronic influenza for tuberculosis. Several of Boggs' cases with bronchiectasis could not be differentiated by clinical signs from tuberculosis with cavity formation. The patients had suffered with chronic cough, profuse expectoration, hemorrhages of varying severity, and in two cases there were distinct signs of cavity formation. No tubercle bacilli could be found, but influenza bacilli were cultivated from the sputum during life and at autopsy were isolated from the lungs. The physical condition of the lungs at autopsy confirmed the diagnosis of bronchiectasis and cavity formation. From their work it is shown that the influenza bacillus may occur alone or associated with other bacilli in acute and chronic respiratory affections.

MEASLES.—L. Hektoen²⁴ has succeeded in producing typical attacks of measles in two healthy men, by *inoculation with blood withdrawn from cases of measles* during the second and fourth days. The

²⁰ British Med. Jour., May 6, 1905.

²¹ Amer. Jour. Med. Sc., Nov., 1905.

²² Boston Med. and Surg. Jour., May, 1905.

²³ Ibid., Dec., 1902.

²⁴ Jour. Infec. Dis., March 1, 1905.

blood was mixed with ascitic broth and kept in an incubator for 24 hours before being inoculated subcutaneously. Fever appeared on the eleventh and fourteenth days, and the course was that of typical attacks of measles.

In 30 of 70 cases of measles *prodromal rashes* were observed and carefully studied by Rolleston.²⁵ The prodromal rashes usually appeared on the first or second days, and in 10 cases preceded the catarrhal symptoms from one to six days. The prodromal rash appeared at the same time as, often indeed much earlier than, the Koplik spots. In order of frequency the rash consisted of isolated macules, blotchy erythema, papules, urticaria, and scarlatiform erythema. Highly characteristic is the simultaneous association of several varieties of eruption unaccompanied by cutaneous irritation. The rashes are usually transient and therefore frequently overlooked.

MALARIA.—The role of the *anopholes mosquito* as a carrier of the malarial parasite is so well established that the literature now has to do principally with *organized methods of prophylaxis*. Excellent results of the systematic warfare against the mosquito have been reported from numerous former hot-beds of malaria. In Italy G. Casardi²⁶ reports as a result of systematic screening of residences a decrease in the number of cases of primary malaria from the former percentage of 38.71 to less than 0.3 per cent. In the Roman Campaigna, almost depopulated by malaria, 2488 railway employees were protected by screened houses, mosquito masks, and prophylactic doses of quinin, so that only 13 cases of primary malaria and 88 relapses occurred. Watson²⁷ reports that as the result of thorough drainage and other prophylactic measures two former hot-beds of malaria are now practically free from the disease, although the surrounding country is still infected. Babes,²⁸ following the advice of Koch and administering prophylactic and curative doses of quinin, reports, from Roumania, that in the treated subjects no primary malaria occurred. In 800 not treated 20 per cent. had malaria.

J. R. Clemens²⁹ emphasizes the *diagnostic value of the almost constant finding of pigmented leukocytes* in cases of malaria, although the parasites may be very few and difficult to find.

Triantaphyllides,³⁰ at the Panhellenic Medical Congress, during

²⁵ British Med. Jour., Feb. 4, 1905.

²⁶ Gaz. degli Ospedali, vol. xxvi, No. 112.

²⁷ Jour. Trop. Med., 1905.

²⁸ Münch. med. Woch., April 4, 1905.

²⁹ Med. News, March 4, 1905.

³⁰ Gaz. degli Ospedali, vol. xxv, No. 139, 1905.

the discussion of the *frequency of cardiac complications in malaria*, stated that in 12,000 cases of malaria he had encountered 67 cases in which there was a cardiopathy for which the malaria was apparently directly responsible; 26 cases were myocardial, and in 23 of the endocardial cases there was a mitral complication. In 16 cases the symptoms resembled those of ulcerative endocarditis. Gallenga describes 3 cases of malaria in which the symptoms at the onset simulated acute infectious endocarditis, but yielded to quinin.

EXPERIMENTAL VARIOLA AND VACCINIA.—W. R. Brinckerhoff and E. R. Tyzzer³¹ have recently reported the results of their attempts to infect monkeys with variola and vaccinia virus. The inoculation of the skin, cornea, and nasal, oral or buccal mucous membrane of the monkey (*Macacus cynomologus*), with vaccine virus gives rise to vaccine lesions at the point of inoculation. The lesions on the mucous membrane show certain differences from those on the skin, but the differences seem to be due to the physical condition at the points of inoculation. The cytoplasmic phases of *Cytoryctes variolæ* were present in the lesions of the mucous membrane but the nuclear phases of the organism were absent. This is consistent with the view that the former cycle is associated with the lesions of vaccinia and the latter with those of variola. Inoculation of the skin of the monkey with variola virus produces a disease with the essential characteristics of variola inoculata in man. The condition is distinct clinically, and differs from variola inoculata in man in the shorter duration of the fever, and the exanthem appears at an earlier date. *Cytoryctes variolæ* are found in the endothelial cells of the capillaries in the corium beneath the primary lesion. Inoculations of the orang-outang produces primary lesions that stand closer to the cutaneous lesions of variola vera in man than do the lesions produced in the monkey. The degree of protection conferred by variolous and vaccinal lesions in the monkey depends upon the virus used and the site of the inoculation. The conclusion is reached that the cytoplasmic forms of *Cytoryctes variolæ* are found constantly in all specific lesions resulting from inoculation with variola or vaccine virus. Intranuclear forms of the parasite appear within the epithelial nuclei in lesions resulting from the inoculation of the monkey with variola virus, but do not occur in vaccine lesions. In the orang the nuclear forms are more abundant than in the variolous lesions in the monkey. The occurrence and distribution of the specific inclusions is best explained by the hypothesis that they are parasites.

³¹ Jour. Med. Research, Jan. 1906.

EXPERIMENTAL SYPHILIS.—Metchnikoff and Roux ²² in their work on the infection of lower animals with syphilis have found that chimpanzees are most susceptible to infection, and the lesions produced most closely resemble those seen in man. *Spirochæta pallida* was found in 23 of the 31 monkeys with syphilitic lesions. The studies seem to show that at least in some cases in animals the syphilitic virus remains localized for a certain period of time, in one case for at least 24 hours. The attempts to prevent the development of syphilis after the inoculation of the animals were not very satisfactory. A salve containing 10 parts of calomel and 20 parts of lanolin prevented the development of lesions in animals inoculated with syphilis one hour previously.

SPIROCHÆTA PALLIDA IN SYPHILIS.—In May, 1905, F. Schaudinn and E. Hoffman reported the finding of a *protozoon*, *Spirochæta pallida*, in syphilitic lesions. Numerous observers have since confirmed the finding of the spirochæta in syphilitic lesions and the current medical journals contain summaries of the work of the observers. The description of the animal microparasite and the methods of its recognition by Giemsa's eosin azure and other special stains are scarcely necessary. The finding of the parasite in the deeper layers of the primary lesions, in the secondary lesions, and in the spleen of a child who died of congenital syphilis, have been reported. Metchnikoff was able to find the parasite in the primary lesions of experimental syphilis in apes. The exact etiologic relation of the parasite to syphilis is not yet definitely determined. At the present time the majority of observers seem to consider it of etiologic significance.

UNCINARIASIS.—G. Blumer ²³ has been able to collect from the literature 1095 cases of uncinariasis that have originated in the United States during the past 5 years. Prior to that time possibly 10 authentic cases had been reported in this country. A number of investigators have succeeded in infecting dogs with uncinaria through the skin. Stiles and Goldberger ²⁴ have recently infected dogs and rabbits with incubated cultures. The fluid was dropped upon the back of the experimental animals and in from 8 to 12 days the young hookworms were found in the intestines of the animals. Sandwith has succeeded in infecting a human being with *Ankylostoma duodenale* by the application of the larvæ to the skin.

²² Annales de l'Institut Pasteur, vol. xix, No. 11, 1905.

²³ Jour. Amer. Med. Assoc., July, 1905.

²⁴ Amer. Med., Jan. 13, 1906.

METABOLIC AND GLANDULAR DISEASES

DISORDERS OF METABOLISM.—C. von Noorden³⁵ in a recent lecture has considered the *present status of some modern problems of metabolism*. Former metabolic studies were concerned largely with the end products alone; of recent years attention has been directed more toward the intermediate stages of metabolism. The question of the metabolism of energy: An adult man in a condition of complete muscular rest requires from 22 to 24 calories per kilo of body-weight during each 24 hours, and with light work from 32 to 36 calories of energy. Children require a relatively high, and old people a relatively low, exchange of energy. The fallacy of using the above average figures is shown by the fact that under exactly the same conditions a difference of from 20 to 25 per cent. arose between single individuals; this can depend only on individual factors. In the consideration of the influence exerted on the production of energy by the respective constituents of the food, certain experiments tend to show that when the food contains an excessive quantity of proteids, the energy production tends to rise higher than is necessary for the muscular work done and for the maintenance of the body warmth. The experiments are not sufficient to change the view that the internal and external body work, and not the kind and amount of food, rules the extent of the oxidation. The theory of vegetarianism would receive support if it could be shown that the old standard of albumin intake for healthy men was too high, and if it could further be shown that large amounts of albumin raised the consumption of energy to an unnecessary extent, or that excessive expenditure of energy follows an excessive intake of animal albumins, but does not follow an excess of vegetable albumins. Von Noorden's recent experiments are against the theory that excess of proteids causes excess of energy exchange.

In regard to the alterations of exchange of energy in disease processes it has been thoroughly established that the administration of thyroid-gland substance is followed by an increase of the energy exchange. A similar increase is found in exophthalmic goiter, and a decrease in myxedema. It has not been definitely decided whether or not people who are run down by chronic disease require the same amount of food as healthy individuals per kilo of body-weight. In regard to obesity, clinical reports indicate the occurrence of cases in which the condition is due to abnormal lowering of the oxidation,—that is, to a diseased state of the protoplasm. Laboratory experiments

³⁵ Jour. Amer. Med. Assoc., Oct. 28, 1905.

have not as yet been able to confirm the clinical reports. In fever the albumin exchanges are increased by toxic influences. The loss of fat and body-weight does not seem to be due to increase in oxidative processes, and the exact cause of the enormous loss of weight is not definitely known.

An excessive amount of food compels a retention of nitrogenous substances in the body. The exact form in which the nitrogen is retained in the body is unknown. The latest studies seem to show that the synthesis of albumin in the body may originate in comparatively simple molecules. The discovery of erepsin in the wall of the alimentary tract is of great importance. This ferment splits up the albumoses and peptones into simpler substances and in particular acts upon the amino-acids. These comparatively simple molecules, such as the amino-acids, assume a new role of importance in metabolic processes.

EXOPTHALMIC GOITER.—In 28 cases of exophthalmic goiter MacCallum³⁶ made careful histologic examinations and found *constant pathologic changes present in the thyroid gland*. The more important changes were a marked variation in the size and form of the alveoli with a tendency to folding and budding of the epithelium. The latter becomes changed from a flat to a cylindrical form. The colloid material is much reduced in quantity. There is an increased blood supply to the gland and the enlarged veins are contained in an abnormally dense and abundant tissue framework. Nodules of homogeneous tissue form small round alveoli and are contained in a hyaline connective tissue framework. The changes though constant are not always of equal intensity. "The anatomic picture corresponds most closely with that of compensatory hypertrophy, which it may be presumed has followed a previous injury to the gland, inflicted perhaps by some infectious agent. In nine of the cases the parathyroid glands were examined and found to be practically normal."

L. H. Mettler³⁷ has called attention to the importance of the recognition of the so-called "*larvated*" forms of exophthalmic goiter. The patients are usually of a neurotic type and suffer from tachycardia, general nervousness, slight tremor, and possibly a slight evanescent struma. The cases may be mistaken for neurasthenia or early tuberculosis.

DIABETES MELLITUS.—M. J. Seifert³⁸ has considered *the relation*

³⁶ Johns Hopkins Hosp. Bull., vol. xvi, No. 173, 1905.

³⁷ Jour. Amer. Med. Assoc., Dec. 23, 1905.

³⁸ Amer. Med., July 8, 1905.

of cerebral traumatism to transient and permanent glycosuria. The previous conclusions are accepted—sugar may appear in the urine as early as 6 hours after a head injury and usually disappears in five to nine days. In a small number of cases a permanent glycosuria follows cerebral traumatism. The frequency of *conjugal diabetes* has been considered by Martinet³⁹ who states that he has observed five cases of diabetes in both man and wife among 25 diabetic patients. Previous observers in 2798 cases of diabetes found on an average about 2.27 per cent. of the cases gave a history supporting the possibility of the occurrence of conjugal diabetes. Labbe⁴⁰ has considered the relation of infectious processes to glycosuria, and cites cases in which the symptoms of diabetes mellitus occurred after an infection process.

K. L. Kaarakascheff⁴¹ has studied *the relation of the islands of Langerhans to the remaining pancreatic tissue* in 11 cases of diabetes mellitus. The islands of Langerhans were usually normal, or showed changes suggestive of vicarious action. The remainder of the pancreatic tissue was more or less degenerated. The possibility of pancreatic tissue regenerating from the islands of Langerhans is considered. H. Leo⁴² has discussed the so-called cured cases of diabetes mellitus. In a number of the cases the symptoms reappear and Leo considers it probable that the disease is really only latent during the period of absence of symptoms. The danger of such persons overtaxing assimilative powers for carbohydrates is emphasized. The prognosis in diabetes is considered by Hirschfeld⁴³ to be favorable in the mild cases under judicious treatment. The comparative rarity of tuberculosis is interesting, and not easily explicable. De La Camp⁴⁴ considers that pregnancy is a very unfavorable complication; such patients often die from coma before delivery. Glycosuria may disappear with the development of a nephritis, but the disappearance does not render the prognosis more favorable.

DIABETES INSIPIDUS.—T. B. Fletcher⁴⁵ has reported from Osler's clinic four cases of primary and five cases of secondary or symptomatic diabetes insipidus. The association between diabetes insipidus and brain syphilis was shown by the fact that five of the patients were syphilitic. The lesions are usually at the base, and meningitic.

³⁹ Presse Medicale, No. 98, 1904.

⁴⁰ Ibid., No. 62, 1905.

⁴¹ Deut. Archiv f. klin. Med., vol. lxxxii, No. 1, 1905.

⁴² Berl. klin. Woch., vol. xlii, No. 2, 1905.

⁴³ Deut. med. Woch., vol. xxxi, No. 5, 1905.

⁴⁴ Berl. klin. Woch., vol. xli, No. 51, 1905.

⁴⁵ Cleveland Med. Jour., April, 1905.

Hemianopsia was present in two of the cases. The reflexes are usually exaggerated, in contrast with the diminution or absence in diabetes mellitus. Mayer⁴⁶ has studied a number of cases of diabetes insipidus and of the conditions in which polyuria occurs. He attributes the condition to a functional disturbance of the kidneys probably of nervous origin. Syphilis or injury to the nervous system was the important associated or causal condition. There is no retention of the solids of the urine. The ability of the kidneys to secrete a concentrated urine seems to be lost. In Fletcher's cases no constant pathologic condition was found. The most frequent change was congestion of the vessels and dilatation and enlargement of the renal tubules. "The condition seems to be due to a vasomotor disturbance of the renal vessels, due either to local irritation or central disturbance of functional or organic type." The prognosis is favorable in the idiopathic cases, but in the secondary cases death may occur from emaciation and exhaustion.

GOUT.—E. Schmoll⁴⁷ believes that uric acid is produced by synthetic processes as well as by oxidation of the purin bases. The synthetic uric acid may probably be prevented from precipitating from the serum by the action of thymic acid. Based upon this conclusion he has used *thymic acid in the treatment of gout*.

HEMOPHILIA.—De Bovis⁴⁸ writes with special reference to *the occurrence of hemophilia in females*. He concludes that hemophilia occurs more frequently in women than is commonly supposed. The hemophilic tendency is especially apt to manifest itself at the time of menstruation, puberty, and the menopause, and as a complication of parturition. In 150 cases of delivery in hemophilic women, excessive hemorrhage occurred immediately afterward in 69. Groszlik and Floderus have previously collected 43 cases of hemophilic hematuria.

DISEASES OF THE BLOOD

CHLOROSIS.—The few articles that have appeared during the past twelve months have consisted of general consideration of the *methods of treatment*, or of the relation of the affection to other diseases. Several observers have remarked upon the relation between chlorosis and gastric ulcer. The possibility of chloroanemia resulting from capillary hemorrhage early in the course of gastric ulcer, and thus

⁴⁶ Deut. Archiv f. klin. Med., vol. xxxiii, No. 1, 1905.

⁴⁷ Jour. Amer. Med. Assoc., April 28, 1905.

⁴⁸ Semaine Médicale, vol. xxv, No. 36, 1905.

being an early symptom, has been suggested. Further clinical observation controlled by careful occult blood tests will probably show the true relation of gastric ulcer and chlorosis.

PERNICIOUS ANEMIA.—Goullard and Goodall⁴⁹ have studied 17 fatal cases of pernicious anemia. The clinical course and blood-picture presented by the cases were characteristic of the disease. The chief points of interest are in the careful pathologic examinations and conclusions as to the nature of the disease. The condition is considered to be essentially a megaloblastic anemia. The widespread evidences of blood destruction occurring in the liver and blood-making organs indicate abnormal vulnerability in the blood-cells rather than excessive hemolytic action on the part of so many diverse tissues of the body. A toxin seems to be produced in some part of the body, but the intestines need not be the primary seat of the toxic process. The toxin acts on the bone-marrow and leads to megaloblastic formation. In certain individuals there may be a congenital defect in the bone-marrow.

APLASTIC ANEMIA.—Since the publication of Senator's⁵⁰ article the so-called aplastic form of anemia has attracted considerable attention and a number of interesting cases have been reported. The cases⁵¹ present the symptoms and physical signs of the ordinary type of pernicious anemia, but usually run a more rapid course, often terminating fatally in about six months. The blood-picture, in contrast with that of progressive pernicious anemia, shows an almost complete absence of nucleated red blood-cells and a marked diminution in the number of leukocytes; in some cases as few as 200 white cells per c.mm. A differential count of the leukocytes shows a relative increase in the number of lymphocytes; often as many as 80 to 90 per cent. of the leukocytes are of the small mononuclear form. The eosinophilic cells are few. The pathologic changes found in the bone-marrow have varied. G. Blumer⁵² classifies the changes into three groups: (1) Cases in which the lesions are those of progressive pernicious anemia; (2) those cases in which the bone-marrow shows primary aplasia; and (3) cases in which there is a hyperplasia of the mononuclear elements of the bone-marrow. The blood-picture in some cases of Barlow's disease resembles that of aplastic anemia, and at autopsy the findings in the bone-marrow were of similar type.

⁴⁹ Jour Path. and Bact., Jan., 1905.

⁵⁰ Zeit. f. klin. Med., vol. liv, Nos. 1 and 2.

⁵¹ Cited in Jour. Amer. Med. Assoc., May 13, 1905.

⁵² Johns Hopkins Hosp. Bull., April, 1905.
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LEUKEMIA.—Hamman, in 1904, was able to tabulate 111 cases of *acute lymphatic leukemia*, and a number of cases have been reported during the past twelve months. In several of the cases affections of the mouth or throat were observed at the time of onset of the disease. In a case reported by W. Mendelson and F. E. Sodern⁵⁵ enlargement of the cervical lymph-nodes was one of the earliest signs and a severe sore throat, resembling acute tonsillitis or diphtheria, followed the glandular enlargement. In the case reported by D. L. Edsall,⁵⁶ the patient had a swelling of the gum which led to the extraction of a tooth, and the early clinical resemblance of the case to diphtheria or angina Ludovici was of diagnostic interest. The tooth extracted was healthy and it seemed that the leukemic infiltration of the gum preceded the infection of the mouth. The patient suffered a tremendous tissue loss, probably of an autolytic nature.

Schupfer⁵⁵ has observed the *influence of infectious diseases on 5 cases of leukemia*. In two cases of lymphatic leukemia the development of tuberculosis did not influence the course of the disease. The occurrence of erysipelas and icterus in a case of myelocytic leukemia caused a diminution of the glandular enlargement, and in a second case the occurrence of a severe attack of entero-colitis caused a marked decrease in the number of leukocytes. An attack of pleuritis and bronchitis caused a slight increase in the number of polymorphonuclear neutrophiles and a decrease in the total number of leukocytes per c.mm. The infections seem to exercise a regressive influence upon leukemic tissue.

The effect of the *Röntgen rays upon the blood-forming organs* of animals, and of man in leukemia, has been studied by a number of investigators. The results of these studies, together with considerable personal investigations, have recently been published by Warthin.⁵⁶

Musser and Edsall⁵⁷ in a study of the *metabolism* found evidence of tremendous tissue destruction in a case of splenomyelogenous leukemia that improved under Röntgen-ray treatment. They conclude that the tissue destruction is probably an autolytic process. They emphasize the danger that may accompany the use of x-rays, and believe that the tissue destruction that they observed indicates the source of this danger, metabolism and excretion being tremendously taxed.

⁵⁵ New York Med. Jour., Dec. 2, 1905.

⁵⁶ Amer. Jour. Med. Sc., Oct., 1905.

⁵⁷ Wien klin. Woch., No. 46, p. 1200.

⁵⁸ INTERNATIONAL CLINICS, 15th series, vol. iv., 1906, p. 243.

⁵⁹ Univ. of Pa. Med. Bull., Sept., 1905.

SPLENIC ANEMIA.—A number of cases have been reported during the past year. Sanford and Dolley⁵⁸ report a case of long duration, with gastro-intestinal disturbances, pain over the splenic area, and tendency to hemorrhage after slight trauma. The patient died after splenectomy, and at autopsy the important finding was dislocation of the spleen with elongation and thrombosis of its vessels. Other changes were chronic passive congestion and fibrosis of the spleen, atrophic cirrhosis of the liver, and hyperplasia of the bone-marrow and hemolymph-nodes. The elongation, torsion, and thrombosis of the vessels constituted a very probable etiologic factor. N. E. Brill⁵⁹ reports a fatal case of primary splenomegaly. At the autopsy the liver and spleen were much enlarged from increased amount of connective tissue and a marked increase of endothelial cells. No typical giant cells were found. The interesting point is the finding of cells of a similar type in the bone-marrow and enlarged lymph-nodes. Umber⁶⁰ has studied the metabolism in two cases of Banti's disease that presented similar clinical symptoms. In one case the metabolic studies indicated an abnormally-increased destruction of albumin and periodical increased elimination of the purin bodies on a purin free diet. The conclusion reached was that the case was one of true splenogenic toxic anemia, the spleen containing some element that is destructive to the blood and also has a toxic influence on metabolism. Removal of the spleen is indicated. In the second case metabolism was not disturbed and the patient recovered.

The few articles cited above serve to show the varied pathologic findings in so-called cases of splenic anemia, primitive splenomegaly, or Banti's disease. The condition, despite the number of types of cases reported, remains one of uncertain etiology and variable pathology. Cirrhosis of the liver, malaria, and thrombosis of the splenic vessels are some of the conditions that may possibly be factors in the etiology of the condition.

CHRONIC POLYCYTHEMIA WITH CYANOSIS AND ENLARGED SPLEEN.—F. Parkes Weber and J. H. Watson⁶¹ discussed the condition, reviewed the literature, and advanced reasons derived from the autopsy findings of a case for suspecting that the bone-marrow played a role in the etiology of the condition. A number of additional cases have been reported during the past year. Several of the cases presented atypical

⁵⁸ Amer. Jour. Med. Sciences, May, 1905.

⁵⁹ Ibid., March, 1905

⁶⁰ Zeit. f. klin. Med., vol. lv, 1905.

⁶¹ INTERNATIONAL CLINICS, 14th series, 1905, vol. iv., p. 47.

symptoms. F. P. Weber ⁶² reported a case which differs from the previously reported cases in that cyanosis was absent. Weber believes that there is an increased activity of the bone-marrow which causes a polycythemia and a resulting increase in the viscosity of the blood. The dilatation of the small vessels and plethora vera are compensatory efforts to overcome the increased viscosity of the blood and supply sufficient plasma to nourish the tissues. The arterial hypertonia is regarded as a result of the greater strain upon the circulatory mechanism, and when cyanosis occurs it is probably due to inadequate compensatory changes. Ascoli ⁶³ reports a case with typical symptoms, but the blood also showed a large number of eosinophiles, 20 per cent. Weintraud ⁶⁴ reports three cases; in one of his cases the spleen subsided to nearly normal size. He also analyzes the cases on record with nearly the same symptoms but without enlargement of the spleen. Reckzeh ⁶⁵ has recently collected 29 cases from the literature and adds 5 cases of his own. He admits that the symptom-complex occurs in some cases of primary tuberculosis of the spleen, but this condition does not explain all cases. In one of his cases a slowly-growing tumor of the thymus and lung caused a gradual compression of the superior vena cava. The result was cyanosis, polycythemia, and enlarged spleen. He claims that experiments on animals confirmed the fact that compression causing stagnation of the blood is alone sufficient to cause the condition. Stagnation of the blood is considered by Reckzeh as the main casual factor. From a review of the reported cases it is seen, as Osler has pointed out, that the symptoms-complex occurs in a number of conditions, but apart from all of those suggested there is probably a considerable number of cases without known etiology. The prognosis is generally bad. Remission may occur, but the cases after a chronic course terminate fatally. No specific treatment has been discovered. Venesection may give temporary relief, x-ray treatment may have some influence on the progress, arsenic was of value in Turk's case, Ehrlich recommends quinin and an iron-free diet. Splenectomy may be dangerous on account of the hemorrhagic tendency of the disease, but is indicated in primary tuberculosis of the spleen.

⁶² *Lancet*, May 13, 1905.

⁶³ *Riforma Medica*, vol. xv, No. 1.

⁶⁴ *Zeit. f. klin. Med.*, vol. lv.

⁶⁵ *Zeit. f. klin. Med.*, vol. lvii, Nos. 3 and 4.

DISEASES OF THE CARDIO-VASCULAR SYSTEM

ARTERIAL HYPERTENSION.—J. B. Briggs⁶⁶ calls attention to the occurrence of *intermittent hypertension with albuminuria* in certain cases of arteriosclerosis. The albuminuria subsides with the relief of the hypertension. The study of the blood-pressure has led to the recognition of the importance of chronic arterial hypertension in the early stage of vascular disease. H. W. Cook⁶⁷ believes that the condition of *chronic arterial hypertension* should be distinguished from other forms of vascular disease, especially arteriosclerosis. The condition is usually amenable to treatment. The symptoms are very similar to those of early arteriosclerosis and the blood-pressure in the systemic arteries is increased from 20 to 100 per cent. The causes of the condition are those of arteriosclerosis, especially certain toxins. A second series of cases result from certain cardiac, pulmonary, and cerebral diseases. The term chronic arterial hypertension is applied to those cases in which a persistent arterial hypertension gives rise to symptoms and precedes the development of signs of any discoverable organic disease. The treatment of the condition is hygienic, dietetic, and especially the use of the nitrites.

ARTERIOSCLEROSIS.—The current theories regarding the *causation of arteriosclerosis* have been subjected to a critical summary by J. M. Cowan.⁶⁸ He concludes that arterial damage may result from many causes. Continued high blood-pressure invariably affects the vessels, and is one of the most important causes of widespread arterial disease. High blood-pressure may result from renal lesions or from alimentary errors. Dietetic errors and imperfect or perverted metabolism may be the initial fault. Various intoxications and severe physical exertion may act as causal factors.

STOKES-ADAMS DISEASE.—Stengel⁶⁹ summarizes the clinical symptoms of Stokes-Adams disease as follows: (1) Slow pulse, the rate falling temporarily or permanently to 30, even less; (2) cerebral attacks such as vertigo, syncopal or epileptiform seizures, unconsciousness; and (3) pulsation of the veins exceeding in rate the pulsation of the arteries twofold, threefold or more. Erlanger⁷⁰ after observing a case of Stokes-Adams disease was struck with the resemblance of the clinical symptoms to the phenomena of *heart block* in animals.

⁶⁶Amer. Jour. Med. Sciences, Aug., 1905.

⁶⁷Jour. Amer. Med. Assoc., Jan. 28, 1905.

⁶⁸Practitioner, Aug., 1905.

⁶⁹Amer. Jour. Med. Sciences, Dec., 1905.

⁷⁰Bull. Johns Hopkins Hosp., June, 1905, and Jour. Exper. Med., Nov., 1905.

He finally devised a satisfactory method of clamping the region of the heart in which lies the only muscular connection between the auricles and the ventricles, the auriculo-ventricular bundle of His. By varying the amount of compression of the muscular bundle in the intact dog's heart he was able to vary the ratio of the auricular and ventricular beats, and finally produce complete heart block, in which condition the ventricles contract independently of the auricular rhythm. He concluded, "that the analogies between the phenomena of heart block in the dog and the signs and symptoms of Stokes-Adams disease are obvious, and we may therefore be justified in predicting that the location of the lesion will be found to be the same in both conditions." Stengel reports a fatal case of Stokes-Adams disease. The patient presented the usual clinical picture of the disease and during the last few days of life a condition resembling complete heart block was seemingly present. The auricular (venous) pulse-rate was from 80 to 140 and the ventricular 18 to 26, with cessation of palpable radial pulse at times for from 45 seconds to 2 minutes and 10 seconds. At the autopsy the important macroscopic lesion found was an atheromatous patch on the anterior mitral leaflet toward its base and extending to the endocardium over the bundle of His. The histologic examination has not yet been reported, but it seems probable that the bundle of His was involved in the sclerotic lesion.

ANGINA PECTORIS.—J. Mackenzie⁷¹ has observed that angina pectoris occurs in lesions of great diversity, but he believes that some condition is common to all cases and must be the cause of the symptoms. For many years he has noted the individual symptoms present in cases of angina pectoris, and has found that the condition appears only after the heart-muscle has been long exposed to excessive strain. All the functions of the muscle-fibers except that of contractility can be shown to be intact in many cases of angina pectoris. The alternating action of the heart is a demonstrable sign of exhausted contractility of the muscle-fibers and its pressure is always associated with symptoms that are included in the description of angina pectoris. Extra strain may produce angina pectoris and alternating action of the heart, and both may disappear with the removal of the cause. The conclusion reached is that the symptoms included under the term angina pectoris are closely associated with an impairment of the function of contractility of the muscle-fibers of the heart.

Kernig⁷² on the other hand concludes that angina pectoris is due

⁷¹ British Med. Jour., Oct. 7, 1905.

⁷² Berl. klin. Woch., vol. xlii, No. 1, 1905.

to thrombotic or embolic processes in the coronary arteries. The coronary sclerosis is apt to produce foci of softening or infarct in the myocardium, or bacteria may pass from the injured area into the pericardium and produce a pericarditis. The autopsy findings frequently confirm this assumption, and show the necessity for absolute rest as the proper treatment for thrombosis and embolism. Enlargement of the left auricle is the almost inevitable consequence of occlusion of the coronary vessels. In one case there was a slight febrile reaction and increase of the pulse-rate, with progressive broadening of the area of cardiac dullness after each attack of angina pectoris. In a second case there was dullness in the left second interspace, but this did not appear until some time after the attack. The heart sounds were very loud in the second left interspace, but were very weak at the apex. The circumscribed dullness in the left second interspace close to the sternum is a most reliable sign of mitral stenosis. In 5 cases of angina pectoris acute pericarditis followed the day after the attack. Huchard has previously found in 185 cases of angina pectoris that came to autopsy, 7 cases of recent pericarditis, 11 cases of chronic pericarditis, and 14 cases of rupture of the heart. In 9 cases published by Pawinski⁷³ an attack of angina pectoris preceded the attack of pericarditis, but he attributed the angina to neuritis of the cardiac nerves although no other evidence of neuritis was shown. The practical points of Kernig's article are: That a certain number of attacks of angina pectoris are followed by pericarditis; when there are signs suggestive of impending trouble it may be necessary in order to save patients from sudden death to keep them in bed for days or even weeks after an attack of angina pectoris. Pawinski concludes that in many cases the infection is primary and the angina is due to neuritis of the nerves of the cardiac plexus. The cases are really angina pectoris of infectious origin. W. H. Broadbent⁷⁴ states that the distinctive characteristic of true angina is that it is induced by exertion and especially by exertion soon after the taking of food. The second condition that is apt to precipitate an attack is excitement. The determining antecedent of an attack is the increase of blood-pressure in the arterial system. The pain may last for hours, but the attacks are usually brief and subside with the cessation of exertion or under the use of nitrite of amyl. The pulse remains steady or becomes irregular, only rarely rapid. During the paroxysm the one condition that seems to be always present is contraction of the peripheral

⁷³ *Revue de Méd.*, vol. xxiv, No. 2.

⁷⁴ *Lancet*, May 27, 1905.

arterioles. Sooner or later sudden death occurs during or at the onset or a paroxysm. The most constant pathologic condition is more or less occlusion of the coronary arteries from a calcareous or sclerosed condition of these vessels with, perhaps, thrombosis. The obstruction of the blood-supply causes general or local degeneration of the heart-wall, and the impaired condition of the heart-wall is the dominant causal factor. The cases which most closely simulate true angina pectoris are those in which there is dilatation of the stomach. Dilatation of the stomach may cause death in angina pectoris or in other cardiac diseases. The presumption is that all cases in which the attacks come on chiefly during repose, however severe they are or however closely they conform to true angina, are probably false or pseudo angina. Mitral disease or aortic disease of rheumatic origin does not give rise to angina. In acute aortitis there may be frequent anginoid attacks while the patient is lying in bed. The attacks are caused in acute aortitis by the mouths of the coronary vessels being blocked. The cases of angina pectoris in which the prognosis is most unfavorable, and in which least can be done for the patient, are those in which the physical signs are negative. The treatment should be directed to the relief of the high tension and the regulation of the habits of the patient, nitrites being given during the paroxysms and iodides in the intervals.

Oliver⁷⁵ believes that in certain cases of angina pectoris in which the arteries are so diseased that they do not respond equally over the entire body to the stimulus of the amyl nitrite, this preparation may do harm. In such cases the arterial tension is already low, and as a consequence of the use of the nitrites unpleasant effects are produced. Osler⁷⁶ classifies angina and anginoid conditions into four groups: (1) The neurotic angina of young persons, which rarely may be fatal and is not due to any coronary or arterial lesion; (2) the syphilitic angina of young men incidental to coronary or aortic arteritis, and sometimes curable by iodide of potassium, though it may develop into aneurism of the first portion of the arch; (3) the presenile angina of the majority of cases, which is part of a widespread arterial degeneration; and (4) the senile angina occurring after seventy, as a terminal climax of arteriosclerotic decay.

ENDOCARDITIS.—Thayer⁷⁷ is of the opinion that *gonorrheal septicemia and endocarditis* are not rare complications of acute urethritis.

⁷⁵ *Lancet*, Sept. 16, 1905.

⁷⁶ *Jour. Amer. Med. Assoc.*, Sept. 19, 1904.

⁷⁷ *Amer. Jour. Med. Sciences*, Nov., 1905.

The endocarditis may be due to the gonococcus, or to mixed infections that have gained entrance through the damaged urethral mucosa, or have later settled on a primarily-infected valve. In two cases the clinical course was that of acute ulcerative endocarditis. In one case the clinical course was that of a continued fever closely simulating typhoid fever. The symptoms of gonorrheal endocarditis do not differ from those due to infection with other pyogenic micro-organisms.

DISEASES OF THE DIGESTIVE SYSTEM.

GASTRIC SECRETION.—Umber⁷⁸ has studied the *secretion of the gastric juice under the influence of fictitious and rectal feeding*. The studies were made on a man, aged 59 years, who had a gastric fistula, as a palliative remedy for a stricture of the esophagus. Hunger caused a clear alkaline fluid to flow from the fistula. After chewing but not swallowing food, gastric juice would flow from the fistula. The secretion would begin to appear in about 3 minutes and the chewing of meat alone would cause a more concentrated gastric juice to be secreted. Brandy would excite a faintly acid secretion, but the chewing of rubber or tobacco would not cause the secretion of gastric juice. Fatigue retarded the commencement of the flow of gastric juice. Nutritive enema caused the prompt secretion of a powerful gastric juice due to reflex action between the rectal mucosa and the gastric glands. The acidity of the gastric juice was as high as 0.35 per cent., an increase over the standard given in text-books. The freezing point showed that there was no attempt to maintain an isotonic relation between the blood and the secretory glands.

EXAMINATION OF THE STOMACH CONTENTS.—Boas,⁷⁹ in considering the sources of error in examining the stomach, concludes that the test-breakfast is a more reliable means of investigation than the test-meal. The test-breakfast originally recommended is one roll (about 35 grams in weight) and 400 grams of water or weak tea, the stomach contents to be withdrawn exactly one hour later. To avoid error it should be determined that the stomach is empty before the ingestion of the test-breakfast, and it is best to give the test-breakfast in the morning as the first meal. The quantitative and qualitative proportions of lab and pepsin as well as hydrochloric acid should be determined. Two or even three examinations with the tube are neces-

⁷⁸ Berl. klin. Woch., vol. xlii, No. 3, 1905.

⁷⁹ Berl. klin. Woch., vol. xlii, No. 3, 1905.

sary in order to obtain unmistakable results. Bile, blood, mucus or saliva impairs the accuracy of the quantitative examinations of hydrochloric acid. Tests for gastrosuccorhea are likely to be misleading, as the preliminary rinsing is apt to induce secretion, and it is impossible to be sure that all of the liquid introduced has been taken out. The determination of the acidity of stagnating stomach-contents and also of the secretions of the fasting stomach-contents are of little value. Boas believes that the presence of normal or increased quantity of hydrochloric acid with only few remains of the test-meal is evidence that the motor function of the stomach is comparatively unimpaired, but, on the other hand, when the stomach is found more or less full, we have no right to decide that the motor function is defective. The latter conclusion is justifiable when the proportion of hydrochloric acid is very small with as much as 150 to 200 c.c. of stomach-contents, unless it is evident that there are no remains of food in the fluid. Boas doubts the practical value and reliability of the new methods of stomach-testing, and regards the old "Leube" method as superior. The new methods at least should be confirmed by the test-breakfast which has stood the test of time in all civilized lands.

Sahli⁸⁰ describes a method of *determining the functions of the stomach*. The test consists in the ingestion of 0.05 gram of methylene blue and 0.1 gram of iodoform enclosed in a capsule that passes unaltered through the digestive tract unless digested by the gastric secretion. The iodoform and methylene blue pill is wrapped in a piece of rubber dam and tied with a string of catgut of a definite size, so that the content of the rubber package is not liberated unless the catgut string is digested by the gastric juice. The test is administered after the midday meal, and the urine, voided at 5 and 7 P.M., and in the morning, is watched for a change in color due to the liberated stain. In health the evening urine should show a change in color. The time of appearance of the iodine reaction in the saliva can also be observed. The only secretion that can digest the catgut is a combination of hydrochloric acid and pepsin.

Dock,⁸¹ after a consideration of the *methods, value, and limitations of the study of the gastric contents*, concludes that examination of the stomach contents gives information that cannot be obtained in any other way. The fact that such examinations are often negative does not justify their exclusion from use, and their neglect leads to

⁸⁰ Correspondenz-Blatt f. Schweizer Aerzte., vol. xxxiv, No. 8, 1905.

⁸¹ Jour. Amer. Med. Assoc., Nov. 4, 1905.

serious risk of error in diagnosis. Gastric examinations should be made in all stomach syndromes, diseases causing metabolic and nutritional disturbances, and in all diseases that affect the function of the stomach, notably diseases of the lungs, heart, liver, kidneys, and blood.

GASTRIC ULCER.—The *incidence of gastric ulcer in America* has been investigated by C. P. Howard⁸² and A. P. Francine.⁸³ Their combined statistics, based upon the frequency with which gastric ulcer is found at autopsy in the large hospitals, seem to show that the condition is less frequent in America than in Great Britain and on the Continent. Howard, in 10,841 autopsies in 7 large American hospitals, found that the percentage of gastric ulcer was 1.32. Francine, in 2830 autopsies at the Philadelphia General Hospital, found 40 cases of gastric ulcer, 1.40 per cent. The frequency of gastric ulcer in Europe is given as from 4.6 per cent. to 8.54 per cent., or even higher; Grunfeld, of Copenhagen, found from 11 to 20 per cent. Howard concludes that "we cannot base accurate or conservative conclusions on data obtained from clinical observation." On the other hand, the fallacy of expressing the frequency of disease processes in terms of the autopsy findings in a certain number of the fatal cases which come to autopsy demands a most liberal interpretation of such statistics.

Wirsing⁸⁴ in a study of 320 cases of *gastric ulcer* comments on the difficulty of making a correct diagnosis of the condition from the clinical symptoms. Pain was not complained of in 52 cases, and in others the pain did not correspond to the location of the ulcer, but was over the solar plexus or the region of the pylorus. The painful spot to the left of the seventh to tenth dorsal vertebra was noted in about one-half of the cases. Change of position caused pain in about one-third of the cases. Other observers have recently called attention to the importance of pain located over the left side of the abdomen as a sign of gastric disease, especially of ulcer. Vomiting during the first three hours after the taking of food occurred in about 59 per cent. of the cases. Hemorrhage was much more frequent among the male patients (only one-sixth of the cases were in males). In three cases hemorrhage, and in some cases perforation, was the first sign of serious trouble.

The relation of *ulcer and carcinoma of the stomach* has been a sub-

⁸² Med. News, Oct. 8, 1904.

⁸³ Amer. Jour. Med. Sciences, March, 1905.

⁸⁴ Archiv f. Verdauungs-Krank., vol. xl, No. 3.

ject for frequent discussion during the past year. C. Graham⁸⁵ in an analysis of the statistics of St. Mary's Hospital, Rochester, Minn., found that over 50 per cent. of patients with carcinoma of the stomach gave a precancerous history extending over a period of three or more years. In an increasing number of cases with short histories ulcer was found to be the earlier lesion. Fitcher found in a series of cases of gastric carcinoma that an ulcer seemed to be the starting point or primary lesion in a number of cases of carcinoma that have been associated with gastric ulcer. The difficulty of determining the frequency with which carcinoma arises secondarily to gastric ulcer is admitted by many observers.

GASTRIC CARCINOMA.—Among the *early signs of carcinoma of the stomach* von Tabora⁸⁶ describes small black clots which are found in the stomach contents. The clots are frequently found in cancer of the pylorus and may require a microscopic examination for their recognition. He has found the clots as the earliest sign of carcinoma preceding the appearance of lactic acid and the presence of Boas-Oppler bacilli. Loss of weight may not occur in carcinoma until motor insufficiency is caused by the tumor. It is difficult and often impossible to distinguish between gastric ulcer and carcinoma. Rusloff⁸⁷ attaches considerable *diagnostic significance to a systolic murmur* heard in the epigastric region and due to compression of the aorta by a cancerous tumor of the stomach. The murmur is not heard posteriorly, and this may differentiate it from the murmur of an aneurism. The sign must be of very uncertain value, however. The *occasional value of glandular enlargement* as a sign of gastric carcinoma is shown in a case reported by W. M. Stevenson.⁸⁸ The left supraclavicular glands were enlarged, but there were no gastric symptoms until much later. The most prominent symptom was marked edema of the legs and scrotum. At autopsy a cancer of the stomach and liver was found, with secondary involvement of the thoracic duct and the left supraclavicular glands. G. N. Pitt⁸⁹ cites 7 cases of carcinoma of the stomach in which the main symptoms were not connected with the stomach. The symptoms were those of ascites and pleural effusion in 7 cases; of intestinal adhesions or obstruction in 5 cases; of abdominal suppuration or iliac tumor in 3 cases; of profound

⁸⁵ Boston Med. and Surg. Jour., Aug. 31, 1905.

⁸⁶ Deut. med. Woch., vol. xxxi, No. 168, April, 1905.

⁸⁷ Medicinskoe Obozryenie, vol. lxi, No. 2, 1905.

⁸⁸ British Med. Jour., May 30, 1905.

⁸⁹ Practitioner, April, 1905.

anemia in 2 cases. The gastric symptoms were usually trivial and the involvement of the stomach rarely diagnosed. Pitt also lays considerable stress on supraclavicular glandular enlargement. The gland most frequently involved and often the only one of the group lies behind the two lower roots of the sternocleidomastoid muscle. The importance of subjecting small subcutaneous nodules and enlarged masses in the region of the umbilicus to histologic examination in cases of suspected carcinoma of the stomach has been previously pointed out by Osler and others.

SARCOMA OF THE STOMACH.—Lecene and Petite⁹⁰ review the literature of 58 cases of *primary sarcoma of the stomach* and add a case observed by them. Sarcoma may develop with symptoms resembling those of carcinoma of the stomach or there may be no gastric symptoms except those referable to an abdominal tumor. In 23 cases, although operation was performed after more or less cachexia had occurred, 12 recovered. The condition is more amenable to surgical treatment than carcinoma of the stomach.

ENDOTHELIOMA OF THE STOMACH.—Cignozzi⁹¹ describes a case of *endothelioma of the stomach* which closely resembled the so-called cases of "plastic linitis." The slow development of the trouble, 6 to 15 years (Brissaud's, Oettinger's and Cizzoni's cases), the gradual development of pyloric stenosis, vomiting with absence of hematemesis and melena, and a smooth movable tumor in the pyloric region with absence of metastasis, and absence of cachexia are the clinical features of the so-called "plastic linitis."

SYPHILIS OF THE STOMACH.—Hayem⁹² reviews four typical cases of *tertiary syphilis of the stomach*. One type of syphilis simulates ulcer, as there is ulceration with hematemesis. A second type suggests benign stenosis, and in a third type there is a tumor in the pyloric region suggesting the possibility of carcinoma. The fourth type simulates cancer with stenosis. The chemical examination of the stomach contents shows the characteristics of chronic gastritis. In the ulcerative type the analysis of the stomach contents may suggest carcinoma. One of the patients, aged 60 years, presented the appearance of a case of cancer, but after operation a history of a chancre 40 years previously was obtained. The patient recovered under specific treatment.

THE OCCULT BLOOD-TEST.—A number of observers have subjected

⁹⁰ Revue de Gynec., vol. viii, No. 6.

⁹¹ Riforma Medica, vol. xvi, No. 26.

⁹² Presse Medicale, No. 12, 1906.

the test to further study during the past twelve months, and it seems from their results that the test should be employed routinely in the study of affections of the gastrointestinal tract. J. D. Steele⁹³ has made a thorough study of the subject, and his conclusions give a clear idea of what can be expected of the test in a number of conditions. Of the two methods of performing the test, the aloin reaction is less apt to be obscured by urobilin, etc., and is more reliable than the guaiac reaction. The aloin test is performed in the following manner: If necessary, the feces are made semi-liquid by mixing with water. The fat is then extracted by shaking with an equal volume of ether, and after 15 minutes the ethereal solution is poured off. The remaining fecal matter is then mixed with one-third of its volume of glacial acetic acid and 10 c.c. of ether. The mixture is shaken and allowed to stand for 15 minutes, and the ethereal extract poured into another test-tube. A solution of aloin in 70 per cent. alcohol is made. Two or three c.c. of the clear aloin solution is mixed with an equal quantity of the ethereal acetic acid extract; 2 or 3 c.c. of ozonized oil of turpentine is added and the mixture gently shaken. If blood is present the mixture becomes first pink in color and then gradually deepens to a cherry red; or the solution of aloin may sink to the bottom of the test-tube and gradually become cherry red in color. At times a deep red ring will form at the line of contact of the liquids. The aloin solution should be freshly prepared and not more than 15 minutes should be allowed for the red color to appear, for after this time the aloin solution will gradually turn red, even if blood is not present. In addition to gastric ulcer and carcinoma, Steele tabulates the following conditions that may give rise to a positive reaction: (a) Extraneous—red meats, carmine and swallowed blood; (b) cirrhosis of the liver, hemophilia and purpura of the gastrointestinal tract, typhoid or tuberculous ulcers, hemorrhoids, fissures and fistula of the rectum. In the diagnosis of a probable gastric ulcer or carcinoma a constantly negative reaction is of great value, as it excludes the probability of ulceration with bleeding. An occasional or even a constantly positive reaction is not of such great diagnostic value because the bleeding may be from a comparatively trivial source as slight hemorrhoids, etc.

DISEASES OF THE LIVER AND GALL-BLADDER

ACUTE YELLOW ATROPHY OF THE LIVER.—R. G. Wells and P. Bascoe⁹⁴ from their study of four cases of acute yellow atrophy of

⁹³ Amer. Jour. Med. Sciences, July, 1905.

⁹⁴ Jour. Amer. Med. Assoc., March 4, 1905.

the liver incline to the view that a further investigation of the condition should be made to determine the relation of cell autolysis to the process. The yellow color of the liver in acute yellow atrophy was found to be due largely to staining with bilirubin. Frozen sections stained for fat showed surprisingly little fat in the degenerating liver cells.

CIRRHOSIS OF THE LIVER.—R. M. Pearce ⁹⁶ has produced *primary necrotic lesions in the livers of dogs* by injecting a hemagglutinative serum into the femoral or abdominal veins. The serum was obtained from rabbits that had been repeatedly injected with the red corpuscles of dogs. The animals usually died within 48 hours after the injection of the serum; those that survived were killed at varying intervals. The reparative process that followed the necrosis was a *chronic interstitial hepatitis* of a definite and constant character. The reparative lesion is considered to be more definitely a *hepatic cirrhosis* than any experimental lesion hitherto described. It is of importance in explaining the histogenesis of cirrhosis and various repair processes in the liver, but does not aid in the elucidation of the etiology of cirrhosis in man. It demonstrates that cirrhosis may follow extensive primary destructive lesions and supports the contention of Kretz that cirrhosis is essentially a reparative process.

A. O. J. Kelly ⁹⁷ discusses *the nature and the lesions of cirrhosis of the liver*, with special reference to the regeneration and rearrangement of the liver parenchyma. He confirms the previous work of Kretz ⁹⁷ and of MacCallum, and points out that the primary changes in cirrhosis consist of a degeneration of the liver cells in the area of distribution of the portal vessels, followed by regeneration of the liver parenchyma; degeneration and rearrangement proceed until complete rearrangement of the liver parenchyma occurs—the cells being no longer arranged radially about the central veins, and many of the central veins having disappeared. The changes in the connective tissue are believed to be largely secondary.

Schiassi ⁹⁸ concludes that *ascites in cirrhosis of the liver* may be due to either obstruction of the portal circulation, to peritonitis, or to a combination of the lesions. If the effusion is due wholly or in part to inflammation of the peritoneum he concludes that it is unwise to attempt immediate surgical interference. Various classifications of

⁹⁶ Jour. Exper. Med., Jan., 1906.

⁹⁷ Amer. Jour. Med. Sciences, Dec., 1905.

⁹⁷ INTERNATIONAL CLINICS, 15th series, 1905, vol. iii, p. 2890,

⁹⁸ Gazzetta degli Ospedali, vol. xxvi, No. 55, 1905.

cirrhosis of the liver based upon etiological factors, anatomical conditions, and clinical symptoms, have been proposed, and these have in turn been modified by other observers. The fallacy of classifications based solely upon the size of the liver is commonly admitted, as is also the difficulty of determining by clinical means whether a liver is smaller than normal.

"Alcoholic hypertrophic cirrhosis without ascites" has recently attracted considerable interest, and has been especially studied by Beauchef.⁹⁹ The important characteristic of this form of cirrhosis is that there is a marked collateral circulation in the abdominal wall, while the hindrance to the portal circulation does not reach a sufficient intensity to give rise to ascites. With the exception of the absence of the ascites, the symptoms of this form of cirrhosis are similar to those of a bivenous hypertrophic cirrhosis. The interesting point in the cases is the absence of the ascites. It may be that other factors besides circulatory hindrances are factors in the production of ascites in cirrhosis of the liver. As previously mentioned, the ascites in cirrhosis may be attributed at least in part to peritonitis. The question then arises as to the nature of the peritoneal involvement, whether it is a tuberculous process or a non-tuberculous chronic inflammation. The condition is of interest clinically because the enlarged and hard liver with a hypertrophied spleen may be difficult to differentiate from a large, fatty, tuberculous liver, a primary carcinoma of the liver, or from syphilis of the liver.

SYPHILIS OF THE LIVER.—König¹⁰⁰ has reported three cases of syphilis of the liver and considered the differential diagnosis of syphilitic affections of the liver from other forms of tumor of the liver. The syphilitic affection may develop suddenly in a person apparently in good health and free from a recent history of syphilis. The early symptoms may be merely signs of a general functional disturbance or symptoms of a febrile inflammatory condition may appear. Attacks of pain over the liver was the first symptom complained of by his cases, followed by loss of appetite and emaciation. A tumor, in some cases movable but in others closely adherent to the liver, was recognized on palpation over the painful area. In one case the liver and stomach were firmly adherent, and it was supposed at operation that the mass was a carcinoma of the stomach with metastasis to the liver. The patient recovered under the use of mercurial inunctions and

⁹⁹ Thèse de Paris, 1905, and Amer. Medicine, Dec. 9, 1905.

¹⁰⁰ Berl. klin. Woch., vol. xlii, No. 6, 1905.

iodides. There was no effusion into the abdominal cavity. There are no special characteristics of a syphilitic tumor that permit of diagnosis before operation, and at the time of operation it may be difficult to differentiate the condition from carcinoma or tuberculosis.

DISEASES OF THE PANCREAS

Thayer¹⁰¹ after a consideration of the 5 cases reported by him and a review of the literature feels that pancreatic disease should be more commonly recognized. The symptoms are more or less characteristic. The onset, sometimes ushered in by an attack of biliary colic, is usually characterized by sudden intense abdominal pain, localized as a rule in the epigastrium, but often more or less general and associated with obstinate vomiting and collapse. The fever is as a rule not excessive and there is a moderate leukocytosis. The attack may be followed by or be associated with jaundice. After a few days the acute symptoms may subside but there remains epigastric tenderness with fever, possibly chills, sweating, and evidence of deep abscess. A deep-seated mass in the upper portion of the abdomen, when perforation of an adjacent organ is improbable, should suggest a suppurative pancreatitis, especially if the onset has followed shortly after attacks of biliary colic. Early diagnosis followed by prompt operation and drainage offer the best chance for relief.

SCHMIDT'S MUSCLE TEST.—Hemmeter¹⁰² in a recent critical summary of the *physiology and pathology of the pancreas*, reports his experience with the muscle-test. Adolph Schmidt determined in his investigations that raw connective tissue can be digested only by the gastric juice, while the nuclear substance of meat fiber can be digested only by the pancreatic juice. The appearance of undigested connective tissue would indicate insufficiency of gastric digestion, and the appearance of nuclei of cells in the feces is significant of insufficient pancreatic secretion. In a case of pancreatic cyst with closure of the duct, and a case of stenosis of the duct from pericholecystitis and cholelithiasis, muscle nuclei were found in the feces. The test for free muscle nuclei as described by A. Schmidt may be performed as follows: Small pieces of slightly fibrous beef are cut into small cubes 0.5 cm. square and hardened for a short time in absolute alcohol. After hardening in absolute alcohol the small squares are placed in small sacs of silk gauze and preserved in alcohol. Before use the

¹⁰¹ Johns Hopkins Hosp. Bull., Nov., 1905.

¹⁰² Amer. Med., March 11, 1905.

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pieces are immersed in water for three hours and given to the patient in wafers. The little sacs may be collected from the feces by means of a Boas stool-sieve. If remnants of nuclei are found they are rinsed in water and stained with methylene blue or treated with acetic acid and examined. The tissue may be hardened in alcohol, sectioned and stained with nuclear stains. If the time of passage of the food was normal preservation of the nuclei justifies the conclusion that there is disease of the pancreas, or at least that there is absence of pancreatic secretion from the intestine. A rapid passage of the sacs through the intestine, as occurs in a diarrhea, may prevent the action of the trypsin. In partial disease of the pancreas the nuclei may be digested. The abnormalities of the fat contents of the feces that are possible in pancreatic disease are summarized by Ury and Alexander.¹⁰³ There may be an increased quantity of fat with a diminished or normal fat splitting. The quantity of fat may be normal with diminished fat. Thayer¹⁰⁴ calls attention to the fact that the careful feeding necessary for satisfactory observations of the digestive processes in acute pancreatitis is usually impossible on account of the serious condition of the patient. The elaborate digestive tests have therefore not been of great aid in the diagnosis of acute pancreatitis.

DISEASE OF THE KIDNEYS

The comparative value of the various methods of determining *the functional activity of the kidneys* has for some years occupied the attention of a large number of investigators. In a contemplated renal operation it is of the greatest importance to be able to determine the presence and functional condition of the other kidney. Rovsing,¹⁰⁵ from clinical and experimental observations, concludes that *cryoscopy of the blood* is the most unreliable of the proposed tests. The commonly accepted view is that catheterization of the ureters is the most reliable of the methods of determining the condition of each kidney. It shows the actual presence of the other kidney, and also the condition of the urine secreted by each kidney. Rovsing concludes that cryoscopy of the urine, and phloridzin glycosuria, have not shown any advantage over the determination of the quantity of urea contained in the urine. Kapsammer¹⁰⁶ admits that *catheterization of the ureters*

¹⁰³ Deut. med. Woch., vol. xxx, p. 1311, 1904.

¹⁰⁴ Johns Hopkins Hosp. Bull., Nov., 1905.

¹⁰⁵ Hospitalstidende Copenhagen, vol. xlvii, Nos. 27 and 28. 1905.

¹⁰⁶ Münch. med. Woch., vol. lii, No. 17, 1905.

is the most valuable test, but thinks that the indigo carmine and phloridzin tests are of some value. If sugar is found in the urine from 12 to 15 minutes after the injection of 0.01 gram of phloridzin, it indicates good functional capacity of the kidneys, while the non-appearance until later than 30 minutes indicates irreparable functional disturbance.

THE VALUE OF EXAMINATIONS OF THE URINE.—The comparative study of the urinary records and the post-mortem findings in the cases of acute and chronic nephritis that have come to autopsy at the Massachusetts General Hospital since 1893, has been made by R. Cabot.¹⁰⁷ The conclusions are reached that many cases of acute glomerular nephritis cannot be recognized by any of the present methods of examination of the urine. In subacute and chronic nephritis the autopsy findings were usually anticipated. In chronic interstitial nephritis about one-third of the cases were correctly diagnosed before death. In the ordinary urinary examinations common errors are: Attempts to estimate the urea without an accurate knowledge of the patient's metabolism. The error is also made of stating that renal cells are present when small, mononuclear cells are present. Cabot concludes that the most reliable data about the urine is the twenty-four hour quantity, the specific gravity, and the color. When implicit reliance is placed upon the urinary findings the senile and arteriosclerotic degenerations are not infrequently mistaken for chronic nephritis, while in conditions involving passive congestion or acute degeneration of the kidney the urine occasionally simulates that of acute nephritis. In cases in which no lesions are found at autopsy the urine is occasionally highly albuminous and full of casts.

Stengel¹⁰⁸ in a study of *albuminuria in nephritis and Bright's disease* remarks that the more accurate urinary examinations and the more careful medical diagnosis of recent years have established the fact that it is necessary to distinguish between nephritis in the sense of the pathologist and nephritis or Bright's disease in the clinical sense. On the one hand, the kidney is prone to slight and transient alterations which may undergo satisfactory resolution without permanent impairment of the integrity of the organ. On the other hand, the presence of slight intertubular exudation, of moderate or even extensive, if uncomplicated, degeneration of the epithelium of the tubules, or of slight alterations in the glomeruli, would not justify a positive

¹⁰⁷ Jour. Amer. Med. Assoc., March 25, 1905.

¹⁰⁸ Jour. Amer. Med. Assoc., Jan. 6, 1906.

assertion that the case was one of Bright's disease in the clinical sense. The distinction is one of degree rather than kind. Albuminuria is an extremely common occurrence in various general diseases, and though it may in a sense indicate an inflammatory condition of the kidney such inflammation or nephritis may be of merely pathologic rather than clinical significance, unless the albumin is considerable in amount and more or less constant in occurrence. The important point is that the diagnosis of renal disease cannot proceed from the urinary examination alone, but taken in connection with the general symptomatology of the case accurate examinations of the urine are indispensable.

C. P. Emerson¹⁰⁹ has made an interesting study of *the various forms of casts that are found in the urine*. The results of the examination of the kidney in over 1000 cases of nephritis, about 500 of which came to autopsy, at the Johns Hopkins Hospital, are given. In the conclusion, emphasis is placed upon the fact "that casts alone are no index of the anatomic renal condition. Their most brilliant display is in non-nephritic conditions; the most serious conditions in nephritis may be accompanied by few or no casts. The nearer normal the cells the better do they seem to form casts when disturbed; in chronic conditions the cells seem to be accustomed to their condition and form few or no casts. The duration of the occurrence of casts is of great importance, and the progress of a given case may be well followed by the casts. Epithelial, blood and pus casts are more common and of less significance than is usually supposed." The cast may be a good index of the present condition of the cell, whether irritated or totally destroyed, but gives no clue to the process behind the condition of the cell, whether a temporary malnutrition or an acute nephritis, or a chronic nephritis with almost entire destruction of the cell and impending uremia.

CHLORIDE RETENTION IN NEPHRITIS.—The blood, kidneys, liver, and other organs were carefully examined by T. Rumpf¹¹⁰ in cases of nephritis. An unmistakable retention of organic substances in the blood and tissues was observed in the early stages of chronic nephritis. In many cases of chronic nephritis the proportion of sodium chloride in the blood and organs was quite high, but in some cases the quantity of chlorides was lower than normal. Serous effusions in nephritis not complicated by cardiac dropsy were usually but not always rich in chlorides. He does not believe that the retention of chlorides is the

¹⁰⁹ Jour. Amer. Med. Assoc., Jan. 13, 1905.

¹¹⁰ Münch. med. Woch., vol. lii, No. 9, 1905.

sole, or in some cases even the chief, factor is dropsy of renal origin. J. L. Miller¹¹¹ has recently reviewed the literature bearing on the elimination of chlorides in nephritis, and also reports the results of his experiments on the retention of chlorides in acute and chronic nephritis. The conclusions reached were that in individuals with apparently healthy kidneys, following the ingestion of sodium chloride there is a chloride retention equal to that of mild nephritis. In patients with severe nephritis, and especially those with uremia, chloride retention is marked and scarcely any of the extra chlorides administered are eliminated. In moderately severe nephritis associated with edema the ingestion of large amounts of sodium chloride is followed by chloride retention. The edema becomes more marked, the albuminuria increases, and symptoms may develop resembling uremia. A. O. J. Kelly and C. A. Fife¹¹² also have recorded some preliminary observations on *the chloride exchanges in nephritis*, with special reference to the dechloridation treatment. The entire absence of chlorides in the urine of two cases of nephritis has been reported by H. J. Bing.¹¹³ When the salt in the organism increased to a certain point, it was eliminated by an excessive gastric secretion and caused profuse vomiting. The vomiting occurred invariably after the patients had taken food containing much salt. The nephritis was not very severe and as the albuminuria gradually subsided the chlorides reappeared in the urine and the attacks of vomiting ceased. The freezing-point of the blood was not affected, and there was no tendency to dropsy.

¹¹¹ Jour Amer. Med. Assoc., Dec. 23. 1905.

¹¹² Trans. Assoc., Amer. Phys., 1905, vol. xx, p. 428.

¹¹³ Berl. klin. Woch., vol. xlii, No. 40, 1905.

SURGERY

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RELATION OF SURGERY TO PATHOLOGY.—J. Collins Warren,¹ professor of surgery at Harvard University, took for his theme in the oration on surgery, at the meeting of the American Medical Association in Portland, "The Surgeon and the Pathologist." "There can be little question," he writes, "that the combination of energies which accomplishes most in surgical progress is that obtained by the coöperation of the laboratory investigator with the surgeon of clinical experience. Too long have these departments of medicine conducted themselves independently, and, as I feel, greatly to the disadvantage to both." To one interested in surgery not only from the standpoint of the clinician, but also from that of the pathologist, it is very gratifying to hear from the head of the department of surgery of a great university such an expression of opinion. Progress in surgery depends on the coöperation of clinical and pathologic investigation. Accuracy of diagnosis can only be obtained by the proper bacteriologic, chemical, and pathologic laboratory studies. Too many surgeons are content to familiarize themselves with the clinical and operative side of surgical lesions only.

Practically every surgical lesion has, in addition to its clinical picture, its characteristic gross and microscopic pathologic appearance. The earlier one sees disease the more difficult becomes a correct diagnosis from the clinical picture only.

Immediate and ultimate results of treatment are, in the majority of cases, progressively improved by earlier treatment. For this reason as the public is educated to seek advice sooner, and as the profession is impressed with the immensely better results of earlier surgical intervention, the more do surgical lesions come under observation in that period of disease in which a clinical diagnosis is difficult, often impossible, even with the modern aids of instruments of precision,—for example, the x-ray, the tuberculin test, tonometer, more accurate

¹ Jour. Amer. Med. Assoc., July 15, 1905.

examinations of blood, urine, stools, stomach-contents, and the eye-ground. In such cases the history and examination, the data of which collectively may be called the clinical picture, allow or justify an exploratory exposure of the part which is the seat of trouble. At this operation the nature of the disease should be recognized from its gross appearances. Granting this to be true, every surgeon requires education in the recognition of the various surgical diseases by the naked-eye inspection. Therefore, every surgeon should desire a sufficient amount of pathologic knowledge to equip him for this new requirement in diagnosis. Such knowledge can only be obtained by the proper systematic and continuous pathologic studies of diseased tissue exposed and removed at every operation. The careful clinical investigation, the keen inspection of the pathologic organ or tissue, followed in every case by a microscopic study, very quickly teach the operator to recognize with the naked eye almost as accurately as the pathologist is able to do with the microscope. Theoretically, the immediate use of the frozen microscopic section of a piece of tissue removed at exploratory operation seems more accurate, and simpler than the recognition from the gross appearances. This subject was given a great deal of discussion at the recent meeting in Portland of the American Medical Association, and is the method employed in many surgical clinics. My own experience has not found this method as simple, nor as accurate, as the recognition from the naked-eye appearances. In recent years I have not a record in which an immediate frozen microscopic section, sufficiently thin and properly stained, cleared up the diagnosis when this was found to be impossible or difficult with the naked eye. It has appeared to me in teaching surgical pathology that the student learns to recognize the gross appearances more quickly and accurately than he does the interpretation of the stained frozen section. The chief advantage of the stained frozen section is that it allows an immediate microscopic view of the case which has just been studied clinically and in which the gross appearances are still vivid in the mind of the operator and student.

When a surgeon becomes his own pathologist, this transformation does not at all trespass upon the field of the general pathologist. The two should work together. The surgeon brings to the pathologist his greater experience with the clinical aspects, the ultimate results and the fresh appearance of the living tissue; the pathologist brings his greater and more expert knowledge of the cellular picture. In this coöperative study the surgeon improves his art of clinical diagnosis and makes more acute his optical recognition of the gross differences

of the various surgical lesions. And I am quite sure the pathologist reaps the benefit of a closer and more practical relation of his department to surgery.

RELATION OF SURGERY TO PHYSIOLOGY.—This is more difficult to express, but nevertheless progress in surgery in the future will depend more and more on physiologic experimental work and modern physiologic knowledge. It may be more difficult to bring about as close a relation between the physiologist and surgeon as between the surgeon and the pathologist, but this must surely come. Surgery requires the aid of the physiologist in many of its most vital problems yet unsolved. The physiologist must be brought in closer contact with the practical problems in medicine and surgery which require physiologic investigation for their solution. Surgical shock is a practical problem which exemplifies the idea just expressed. One should read Crile's contribution to this subject and the paper² he read before the Johns Hopkins Hospital Medical Society in March, 1905, which was discussed by Dr. Howell, professor of physiology. At a recent meeting of the section of neurology of the Medical and Chirurgical Faculty of Maryland the intimate relation between physiology and practical surgery was again demonstrated. In the symposium on brain tumors Dr. Howell, a physiologist, opened the discussion with a clear description of the recent work done by physiologists on cerebral localization and the function of this complicated organ. The atmosphere was at once cleared for the practical discussion of clinical diagnosis and operative treatment. Brain surgery would have been impossible without the work of the physiologist. The future progress in this special line depends more upon the work of the physiologist than any improvement in operative technic. Dr. Osler, in his discussion, emphasized this and remarked that in the many symposiums the discussion should be opened by the physiologist. This expert laboratory investigator should be more often invited to discuss his side of the question before the medical societies. How few surgeons keep pace with the new results of modern physiologic investigations! At the bedside and in the clinic, how seldom is the physiology of the lesion mentioned for the benefit of the student! The importance of the recent work on blood-pressure done in the physiologic laboratory is just being realized in practical medicine and surgery.³

In a recent investigation on the clinical aspects of surgical shock

² Johns Hopkins Hosp. Bull., Aug. 1905, vol. xvi, p. 269.

³ Monograph by Erlanger and Hooker, Johns Hopkins Hosp. Rep., vol. xii, 1904.

I found that any definite conclusions were practically blocked on account of the absence of a sufficient number of diastolic and systolic pulse records properly and accurately recorded. For this reason a proper investigation of the subject from the practical and clinical side must be delayed until there are introduced blood-pressure records on a great number of surgical patients before, during, and after operation.

THE DECISION AS TO OPERATIVE INTERVENTION.—As the field of surgery enlarges, and as pathologic conditions come for surgical aid earlier in their period of life, the more difficult does it become to decide whether an operation is justifiable. Although the immediate and permanent results of operative surgery are improving, the greater number of individuals coming under surgical treatment have increased in almost geometric ratio the number in which a decision for or against operative intervention is difficult. In spite of the safety of surgical intervention at the present day, the responsibility of the surgeon has increased. When a patient seeks aid with a definite lesion in which there is no question that an operation must be performed, the realization, that the dangers of non-interference are far greater than the risks of operative interference, makes the responsibility of the surgeon comparatively light. However, when there is any doubt as to the justification of an operation, the responsibility of the operator and the physician increase in direct proportion to this uncertainty. The number of such cases is daily increasing. It is in this group that the most careful and conscientious investigation with every possible instrument of precision should be followed out. It is in this group that the various possible postoperative fatalities and complications are most keenly felt. Bad results here throw an odium on surgery which for a time impedes progress. Comparatively the majority of surgical interventions are so easy, operative technic is so safe, fatal results, dangerous and painful postoperative complications so rare, the indications for surgical treatment so clear, and in some cases so urgent, that the busy practitioner and operator is very apt to lose his perspective and his eternal vigilance in the other group of cases in which the indication for operative intervention is doubtful. In many cases the operation may be unnecessary, in others distinctly contraindicated; to use a phrase so common to-day, surgical intervention in this increasing large group "demands investigation." This investigation, I trust, will be made within the profession and by the profession. Let each operator carefully and conscientiously look over the records and results of his patients in which the operation belongs to this group.

ANESTHESIA

LOCAL ANESTHESIA.—Nothing especially new has appeared on local infiltration, intraneural, or paraneural anesthesia. Its field of usefulness increases in direct proportion to the increasing skill in its technical application. I find that operators either use it very little, or very much; for example, in Dr. Halsted's surgical clinic the hypertrophied thyroid of exophthalmic goiter is always attacked under local anesthesia. In other clinics general anesthesia is preferred; for example, Hartley⁴ of New York prefers ether and writes, "the cases which demand local anesthesia and in which general anesthesia is contraindicated I have not seen as yet. An experienced anesthetist is absolutely necessary, and a very small amount of the anesthetic is to be used." Hartley's results are apparently as good as those obtained in operations under local anesthesia. If further experience confirm this, it would be a great saving of time to those surgeons whose present experience seems to indicate that local anesthesia is a safer method.

SPINAL ANESTHESIA.—This has received a new impetus by the most recent contribution by its originator, Bier.⁵ The improvement consists in the substitution of stovain for cocain, and in the addition of adrenalin. However, in a comparative review of other contributions on the same subject from different clinics, one cannot but be impressed that much of the improvement can be explained equally well by the better technic and greater experience of the individual in minor details. Practically every contributor records better results, apparently equal to those of Bier, but with different drugs. Fuster,⁶ in von Hacker's clinic in Graz employs tropacocain, Kurzwelly⁷ reports from Braun's clinic in Leipzig, who uses cocain. Both Fuster and Braun also use adrenalin. Sonnenburg in the Moabit Hospital in Berlin and Peonaru-Caplescu⁸ also use stovain; but the latter without adrenalin. A description of Bier's new technic has recently appeared by Dönitz.⁹ The discussion of the present status of this subject which took place before the recent German Surgical Congress was reviewed recently in the *Annals of Surgery*.¹⁰

A sufficient number of cases in which this form of anesthesia has been employed has been recorded to take this method of anesthesia out

⁴ Ann. of Surgery, July, 1905, vol. xli, p. 33.

⁵ Archiv f. klin. Chir., 1905, vol. lxxvii, p. 198.

⁶ Beiträge zur klin. Chir., 1905, vol. xlvi, p. 1.

⁷ Deutsche Zeitschrift f. Chir., 1905, vol. lxxviii, p. 142.

⁸ Revista de Chir., 1905, No. 1.

⁹ Archiv f. klin. Chir., vol. lxxvii, p. 940.

¹⁰ Ann. of Surgery, 1905, vol. xlii, p. 941.

of the experimental stage. Its indications and contraindications are not fully established. Its most important field of usefulness would be in that group of cases in which kidney function is impaired. Here general anesthesia is dangerous, and many of the necessary operations are difficult or impossible under local infiltration. Should further experience demonstrate that intraneural anesthesia is less dangerous in patients in whom the eliminating function of the kidney is impaired, Bier will have conferred a great advance upon surgery.

SCOPOLAMIN-MORPHIN ANESTHESIA.—In the last year numerous reports have appeared, one of the earliest in this country being published by the *INTERNATIONAL CLINICS*, by Terrier.¹¹ The reports may be divided into two groups, those in which the narcosis has been produced by the hypodermic injection of morphin and scopolamin alone, and those in which this hypodermic medication has been employed preliminary to the general anesthetic. There are two excellent recent reviews of the literature, with the addition of their personal experience in this method of anesthesia, by Ries,¹² of Chicago, and Seelig,¹³ of St. Louis. Seelig uses scopolamin-morphin hypodermatically as a preliminary to general anesthesia. The latter he begins with ethylchloride, followed by ether administered with the *Bennet* apparatus. Dr. Seelig in a personal communication states that he considers ethylchloride almost as safe as nitrous oxide as a narcotic to begin ether anesthesia.

GENERAL ANESTHESIA.—This is a subject to which I have given a great deal of attention and which since 1899 I have followed closely in the literature, with the conclusion that ether is the anesthetic of choice, and that it should be given by the drop method on an open chloroform mask. This method, I find, is employed in Mayo's clinic in Rochester. Alice McGraw¹⁴ reports 11,000 ether narcoses with this method without a death. During the last year this method has been employed in the surgical clinics of the Johns Hopkins and the Union Protestant hospitals, and, I think, with decided improvement. I have no personal experience with the various apparatus for giving chloroform or ether, or the various mixed narcoses, but I am impressed with the conclusion that safe anesthesia is an art to acquire which demands experience and an individual adaptability. The expert anesthetists who are so extensively employed in New York and London, the various

¹¹ *INTERNATIONAL CLINICS*, 1905, 15th series, vol. ii, p. 228.

¹² *Ann. of Surgery*, Aug., 1905, lxii, p. 193.

¹³ *Ibid.*, p. 185.

¹⁴ *New York and Phila. Med. Jour.*, Nov. 12, 1904.

experts who contribute to German periodicals, and the numerous younger men who become expert anesthetists in the various public and private hospitals of this country, soon acquire a method of their own and give the single or mixed narcotic with various forms of apparatus, original or modified. With these facts before one, it is only natural to conclude that the safety of the anesthesia depends more on the individual who conducts the narcosis than upon the apparatus or narcotic employed, except as above stated, ether apparently alone or in some combination being the anesthetic of choice. I am quite convinced, however, that the inexperienced anesthetist should always be instructed to use ether, and I would advise the drop method on the open chloroform inhaler, as recommended by Alice McGraw.

The problem as to the choice of the anesthetic is a most difficult one, not only whether it should be local, spinal, scopolamin-morphin, or a general cerebral; but if the latter, what drug, ether, chloroform, or some combination with oxygen, ethyl-chloride, nitrous oxide, or brom-ethyl. In the great majority of patients subjected to an operation, the general condition is such that a cerebral narcotic is not contra-indicated, and ether will be the anesthetic of choice. Every operation which can be performed under a local should never be done under a general anesthetic. There is a smaller, but very much more important, group, in which the anesthesia is a distinct element of danger. This risk may be caused by a marked anemia, a definite lesion in the lung, heart, or kidney. These cases should be studied most carefully clinically before operation is undertaken, and not only should the selection of the method of anesthesia be most critically considered, but it should also be given by the most experienced available anesthetist. In the clinical examination of the patients before operation the rare condition of status lymphaticus should be considered. This subject has been recently considered by Parks,¹⁵ of Buffalo.

Bevan,¹⁶ of Chicago, has given a most interesting and important contribution on acid intoxication and the late poisonous effects of anesthetics; Guthrie¹⁷ on aciduria (acetonuria) as the cause of deaths following the administration of chloroform and ether. In a contribution on a similar subject by Brackett, Stone and Low,¹⁸ of Boston, deaths are recorded from the same condition in children, both without and after general anesthesia.

¹⁵ Trans. Amer. Surg. Assoc., vol. xxiii, 1905.

¹⁶ Jour. Amer. Med. Assoc., Sept. 2, 1905.

¹⁷ Lancet, Aug. 26, 1905.

¹⁸ Boston Med. and Surg. Jour., vol. cli, July 7, 1904, p. 2.

POSTOPERATIVE COMPLICATIONS

In the paragraph devoted to the decision as to operative intervention, I emphasized how prominent postoperative fatalities and complications become in that group of cases in which there is a reasonable doubt as to the propriety of operative intervention. No great progress has been made in our knowledge of the exact etiology of many of these complications, nor as to methods for the prevention of their occurrence.

Lung complications are recently considered by Kelling¹⁹ and Bibergeil,²⁰ postoperative parotitis by Wagner.²¹

Lerda²² reports on the pathologic changes in the urine after operative traumatism; Madelung²³ has a very extensive paper on the postoperative prolapse of abdominal entrails.

One, therefore, is struck by the absence of many recent contributions on this important subject. I was especially interested in Wagner's contribution on parotitis. I did not realize that the mortality was 30 per cent. in cases in which there was no infection in the field of operation. In the five cases which I have observed there were no deaths; in one of these, following a clean hernia operation, the inflammation was bilateral, and abscesses developed which required incision. This complication, according to Wagner, has only been observed during the last twenty-five years, and it is interesting to note that the first cases followed ovariectomies. Since then parotitis has been recorded after all forms of operation, always after a general narcotic. The consensus of opinion favors infection from the mouth as the etiologic factor. This is aided by the effect of the anesthetic decreasing the oral secretion and traumatism over the parotid (holding the jaw forward) during narcosis. Wagner recommends thorough disinfection of the mouth as a means of prevention. In von Eiselsberg's clinic in Vienna during the last two and a-half years five cases were observed, two after gastric and two after intestinal operation, and one after cholecystectomy; three patients died, but it is important to note that the autopsy revealed a purulent pneumonia. As a rule in parotitis the symptoms begin on the fifth to seventh day.

Lerda's studies on the changes in the urine after operation are not as exhaustive as one would wish. He reports on the urine examin-

¹⁹ *Centralbl. f. Chir.*, 1905, vol. xxxii, No. 30, p. 44, with discussion, and *Archiv. f. klin. Chir.*, 1905, vol. lxxiii, p. 301.

²⁰ *Archiv. f. klin. Chir.*, 1905, vol. lxxvii, p. 339.

²¹ *Centralbl. f. Chir.*, 1905, vol. xxxii, p. 748.

²² *Centralbl. f. Chir.*, 1905, vol. xxxii, p. 1314.

²³ *Centralbl. f. Chir.*, 1905, vol. xxxii, p. 39.

ation after 265 operations performed in Isnardi's clinic in Turin. Operations on the bladder and kidney are excluded. In two patients in whom albumin was present in the urine before operation it was increased after. In at least 8 per cent. of cases in which the urine was negative before, it contained albumin after operation. As a rule cylindruria was also present. This was associated with decrease in the amount of urine, higher specific gravity, and a great increase in urates. Unfortunately in the only fatal case in which this was found after operation, the autopsy did not disclose the cause. All of these cases had a general anesthetic. In only two among thirty-four operations without a general narcotic was albumin found in the urine. This albumin generally disappears on the second to fourth day. Lerda gives no details in regard to the six cases in which sugar was found after operation. My own experience teaches me to dread a scanty urine much more than the presence of albumin after operation. The presence of a small amount of albumin before operation is not of itself a contraindication.

Recent literature on the various methods of estimating the functional activity of the kidney has demonstrated the unreliability of the various tests. There is no more difficult problem than the estimation of renal activity. It is surprising how few of our patients dying with anuria have had any symptoms previous to operation. This has led surgeons to give the majority of their patients the benefit of the doubt, and treat them for some days after operation on the principle that there is danger of impaired kidney function and its results. The majority of operative patients should have enemas of salt solution until they are able to take sufficient water by mouth. In some cases subcutaneous infusions should be employed one or more times. In an investigation by my colleague, Dr. Finney, he found that the convalescence after his gall-bladder operations was much better if the amount of urine was increased to 1000 c.c. or more, per diem, by rectal enemas or subcutaneous infusions. This has been my own experience. I believe that this salt-water medication by rectum or subcutaneously is one of the most important postoperative therapeutic agents to prevent renal complications, and that the majority of patients should be treated on the principle of possible postoperative renal insufficiency. Especially is this true if a general anesthetic is used, ether as well as chloroform, and more especially after abdominal operations. In some cases, with lesions of the kidney there should be before operation for some days a special diet, associated with a thorough cleansing of the bowels and the administration of large quantities of water, to prepare the patient and the kidney for the deleterious effects of the anesthetic.

Madelung^{23a} was able to collect 157 cases of prolapse of the abdominal viscera after laparotomy. I am inclined to think this represents a very small number of the actual cases, and Madelung remarks that seven were personal communications, and six from his own clinic. Of course, the chief interest of such an investigation is in regard to what form of suture and material gives the best insurance against this unfortunate result. The break-down and prolapse is usually immediate, but the accident has happened as late as from five months to twelve years after operation, in all but four of these preceded by hernia. The mortality of this complication was twenty-two per cent. The surgeon must hold himself responsible for the proper suture, and if catgut is used it must be in a form which, experience has demonstrated, retains its strength until proper healing has taken place. In the second group there may be obstacles against which no form of suture is sufficient—the local condition of the tissues, the general condition of the patient, the unavoidable suppuration, and the constant cough after operation. No method of suture for the closure of the abdominal wound is sufficient for all cases. To close a small gridiron (McBurney) muscle-splitting opening is a simple affair, but when long incisions are necessary through the linea alba or through an attenuated rectus muscle the approximation of the tissues must be more perfect, the number and strength of the sutures greater. Tension of the wound can be lessened by the proper application of adhesive straps. I am inclined to the opinion that this second group of cases will become smaller and smaller as the surgeon realizes the different conditions and meets them with means generally within his control. This postoperative complication should, however, be constantly borne in mind. If recognized early, and there are no other complications, the immediate reduction of the prolapsed viscera and secondary suture is usually followed with recovery. As a rule these patients suffer no pain; they are uncomfortable, nausea is frequently present, and the pulse has a rapidity which is very suggestive of some complications. Whenever in doubt the wound should be examined, and it is important to remember that the skin in a few cases has remained intact, the deeper wound only giving way. It has been my good fortune never to have observed this complication in the closed wound. On two occasions in which extensive gauze-packing had been employed a small loop of intestine protruded; this was recognized very early on account of the nausea, the loop was returned, and both patients recovered.

²³(a) The data for these remarks are taken from the abstract by Mr. P. Wroth, Jr., of the fourth-year medical class.

Cordier,²⁴ of Kansas City, presented a very interesting paper before the section on surgery of the American Medical Association on phlebitis following abdominal and pelvic operations. He found it occurred in about two per cent. of abdominal operations, more frequently in anemic individuals, and, strange to say, it is more often observed in those cases in which the field of operation was aseptic, irrespective of the position of the incision; ninety per cent. are on the left side, and anatomic peculiarities of the veins do not give satisfactory explanation. Primarily the disease is a phlebitis, the thrombosis is secondary. Many of the cases of postoperative pneumonia and pleurisy are explained as embolic from the local thrombus in the limb. In a few instances the emboli have reached the brain. At the present time we know of no preventive treatment.

This is one of the most uncomfortable postoperative complications. In my own experience, which deals chiefly with operations in the upper abdomen and less frequently with pelvic manipulations, the complication has occurred in about 0.7 per cent. It is therefore more frequent after pelvic operations. In abdominal operations I found it more frequent when the manipulation is in the lower abdomen, for example, after herniotomies and appendectomies, than when the operation is performed on the upper abdomen. It is comparatively rare after operations upon the stomach, pancreas, and gall-bladder. It is interesting to note, however, that it may occur after any operation. I have one record in which quite an extensive phlebitis of the left leg followed the removal of a diffuse, huge lipoma of the neck. So far I have never observed it after an operation performed under local anesthesia. The blood-count records are not sufficiently complete to make a positive statement, but apparently they indicate that the complication is much more common in the chlorotic individual. It is unusually rare in the robust patient. In a few cases death has taken place from emboli; as a rule in these cases the phlebitis of the leg has not manifested itself. After the phlebitis has become established, fatal cases are unique.

OPERATIVE TECHNIC

During the past few years, especially the last, there has been a distinct decline in the number of communications on technic. Some years ago I ventured the statement that operative technic was far in advance of surgical diagnosis. To-day the trained surgeon regards technic in a much different light than he did some years ago; its

²⁴Jour. Amer. Med. Assoc., Dec. 9, 1905, p. 1792.

detailed scheme is so much a part of his daily life, that it has become his second nature, and this part of the day's work now gives no anxiety and causes little or no wear-and-tear. A tremendous advance, therefore, over the early days of Listerian surgery, when the great Billroth bitterly complained of his results, of his daily anxiety and chagrin. In 1881 he wrote: "The proper management of cases under the antiseptic system is the most difficult task I have ever attempted; still this shall not deter me from doing my very best to perfect the system." In looking over the histories of the cases treated in Dr. Halsted's clinic the gradual change of the mental view of the case subjected to operation is interestingly and graphically pictured in the descriptive operative note which has usually been written by the resident surgeon or one of his assistants. In the early years this description was all technic—the length of the incision, the exact method of suture, the number of vessels tied, or clamped, and ligatures used; how the skin was disinfected; whether irrigation was used or not; the suture material employed. We observe the change from silk to silver-wire and back again to silk; the rather remittent and spasmodic use of catgut; a few instances of copper-wire; the introduction of silver-foil and gloves; the discarding of bichloride irrigation; the absolute dry aseptic treatment, etc., etc. In the early histories very little is written on the pathologic appearance of the tissues exposed by the knife—everything was technic. Later it is observed that more and more was written on the appearances of the tissues exposed, of what might be called gross pathologic anatomy of the field of operation, and less and less on technic. For example, it is seldom noted now that gloves are worn; in fact only sufficient data of the technic are recorded to give an idea of how the wound was closed. For example: McBurney's incision, closed with silk; rectus incision, catgut in peritoneum, silk in muscle, etc., etc. Comparatively the descriptions of the operation are increasing in length. This demonstrates that even the younger surgeons are more interested in recording the now more important topographic conditions at the operation rather than to spend time in needless repetition of routine technic.

WOUND TREATMENT.—For many years I have agreed with those practical surgeons who did not believe that Schimmelbusch's brilliant laboratory investigations on aseptic and antiseptic surgery could be applied to the treatment of accidental wounds. It is quite true that in the so-called aseptic operation, where everything can be sterilized by heat except the skin of the patient, and where, if the scheme is per-

fectly carried out, there is no portal of entrance for an infection except from the skin of the patient and the atmosphere, antiseptics are unnecessary. When from environment and other circumstances this perfect scheme of asepsis cannot be maintained the surgeon should act on the principle that the operative wound is infected. Antiseptics should be used and drainage employed. The results of Lister's method, which consisted in the employment of nothing but carbolic acid and drainage, not even combined with ordinary cleanliness, are facts which cannot be disputed.

Friedrich²⁶ in a recent contribution on the treatment of wounds, infected or suspicious of infection, including panaritium, phlegmonous, furunculous inflammations, again emphasizes the importance of antiseptic treatment. He states that the infection of accidental wounds is seldom if ever the same as those infected by Schimmelbusch in the laboratory from pure cultures. Wounds even of six to eight hours' duration can and should be disinfected. The results usually are good. It is very important, in the treatment of an accidental wound, to bear in mind the possible sources of infection. At the autopsy and in the bacteriologic laboratory an infection similar in character to those produced experimentally by Schimmelbusch is possible. Such wounds, if the known infecting agent was virulent, should be excised and left open, but this radical procedure will not always prevent a general infection through the lymphatics or blood. For the treatment of the general infection we have no specific, except for tetanus and diphtheria, the antitoxins of which should be given at once. It is very important to record here, and with great emphasis, that the consensus of opinion of all proper authorities at the present time is that the other so-called antitoxins on the market—streptococcic, antistreptococcic, pneumococcic, etc., are not only not specific, nor of any therapeutic value, but harmful. They contain bodies which inhibit the production of immune bodies in the blood of the infected individual. I am inclined to think that public opinion at the present time rather favors their administration, and the attending physician or surgeon is apt to yield to this pressure, even if his views be against their use. The same is true in regard to all the advertised treatments of malignant tumors. The problems here, however, are different. The disease is hopeless; the treatment apparently does no harm; in many instances it may give some mental comfort.

In all accidental wounds soiled with earth, or from cheap firearms,

²⁶ Deutsche med. Woch., 1905, No. 27; reviewed in Centralbl. f. Chir., 1905, vol. xxxii, p. 942.



FIG. 1.—Microscopic drawing of a fetal adenoma.

the possibility of a tetanus infection should be borne in mind and the antitoxin should be given as a routine, the sooner after the injury the better. During the last four years communications on this subject are so numerous, and the facts so indisputable, that it should be considered just as much of a neglect not to give the tetanus antitoxin in these cases as to omit the antitoxin in a case of diphtheria.

In all accidental wounds thorough cleansing and disinfection is necessary. Ragged tissue should be excised. The problem as to partial or complete closure of the wound depends upon the number of hours since the injury, the character of the material infecting the wound, and the character of the tissues injured. When in doubt drain, or leave the wound wide open.

SURGERY OF THE THYROID

The problems of greatest interest at the present time are the surgical treatment of exophthalmic goiter, the early recognition of malignant tumors, the relation of atypical exophthalmic goiter symptoms to tumors of the thyroid, like cysts and adenoma, the effect of the x-ray on simple and exophthalmic goiter, lesions of the parathyroid and accessory thyroid tissue, the relation of thyroiditis to myxedema, and whether thyroidectomy is safer under local or general anesthesia.

In *Surgery, Gynecology and Obstetrics* for August, 1905, I presented a contribution on Cysts of the Thyroid Gland, and for February, 1906, on Adenoma of the Thyroid Gland. These communications are to be followed later by clinical and pathologic studies of malignant tumors, simple and exophthalmic goiter, and chronic thyroiditis.

Lesions of the thyroid gland are very rare before puberty. The few cases of congenital tumors are fetal adenomas (Fig. 1). Myxedema may be congenital, when it is called cretinism. This disease is most common where simple goiter is endemic. At puberty slight enlargement of the thyroid is not uncommon both in the male and female. Many cases of simple goiter and adenoma date their onset from puberty. During, or shortly after, pregnancy thyroid enlargement will be observed not infrequently. This has been found to be an etiologic factor in simple goiter and adenoma. The moderate enlargement of the thyroid at puberty and pregnancy usually disappears; it should give no anxiety and requires no treatment. The hypertrophy of exophthalmic goiter has apparently no relation to puberty or pregnancy. Its etiologic factors are not established. Cysts of the thyroid gland or accessory portions of this gland are observed at almost any age.

Malignant tumors of the thyroid are observed after 30 years of age. Their relative frequency as compared with benign lesions is small. The possibility of a cure is slight unless the tumor is removed in a very early stage.

TETANY.—MacCallum²⁶ has demonstrated that this nervous affection is due to the removal of the parathyroid glands and not, as stated in many text-books on surgery, dependent upon the removal of the entire thyroid gland. Other forms of tetany can be explained by the effect of toxins on these minute glands near the thyroid, for example, gastric tetany.²⁷ The parathyroid origin of tetany is also discussed by G. Marinesco.²⁸ Both this authority and MacCallum have used beef parathyroid glands in the treatment of this condition. He suggests that eclampsia may be the result of parathyroid insufficiency. Vassale²⁹ has had apparent success in the treatment of the latter lesion with an extract of the parathyroid gland.

POSTOPERATIVE THYROID INTOXICATIONS.—We must distinguish clinically three groups of general symptoms which may follow operations upon the thyroid. First, tetany. This is a distinct clinical picture, an uncommon complication at the present time because no one attempts complete thyroidectomy, and many, with the knowledge of the function of the parathyroid, save that portion of the remaining lobe near which these glands are situated. The symptoms are observed from a few to ten days after operation. The mortality is high; eight out of twelve of Billroth's cases died.

Early diagnostic signs are: Tapping the region of the facial nerve produces a lightning-like contraction of the facial muscles (Chvostek's sign). Pressure on a large artery or nerve-trunk produces spasmodic contractions in the muscles of the corresponding extremity (Trousseau's phenomenon). When all the parathyroids are not removed the symptoms are either absent or mild, and the patient recovers. The term acute postoperative myxedema is now a misnomer. The condition should be called tetany; it has no relation to the thyroid or to the condition myxedema.

ACUTE THYROID INTOXICATION.—Following partial thyroidectomy, more frequently when the lesion is exophthalmic goiter, there may be acute symptoms, resembling an intoxication or infection: high temperature, rapid pulse and respiration, delirium, and, in critical cases,

²⁶ Johns Hopkins Hosp. Bull., April, 1905, vol. xvi, p. 148.

²⁷ See Howard's case, *ibid.*

²⁸ Semaine Méd., Paris, vol. xxv, No. 25, June 21.

²⁹ See also Gottschalk, Münchener med. Woch., vol. lii, No. 24.



FIG. 2.—Normal thyroid of a dog.



FIG. 3.—Colloid vesicles of a simple goiter.

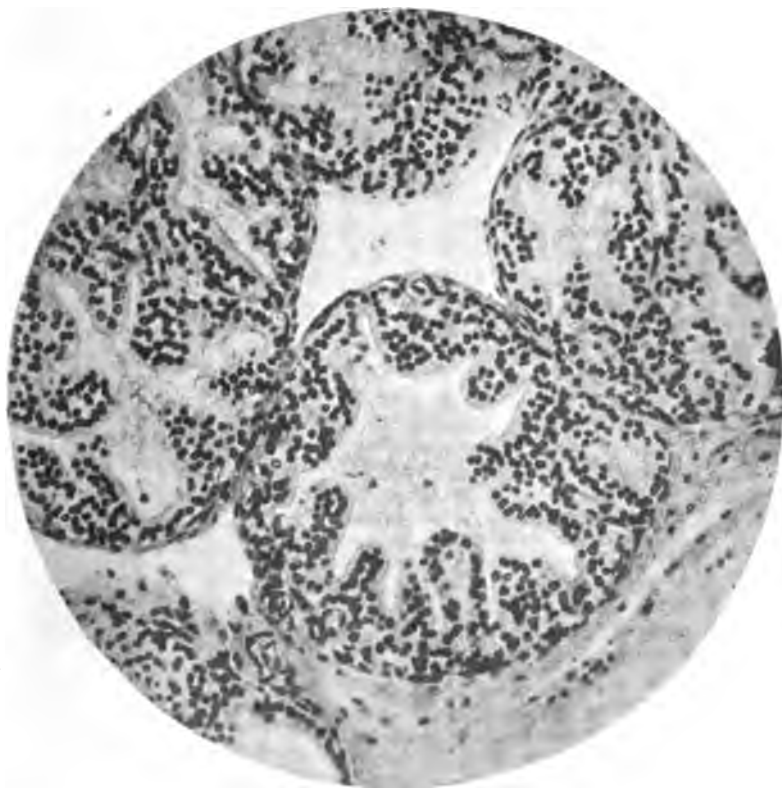


FIG. 4.—Advanced hypertrophy of the thyroid in a dog.

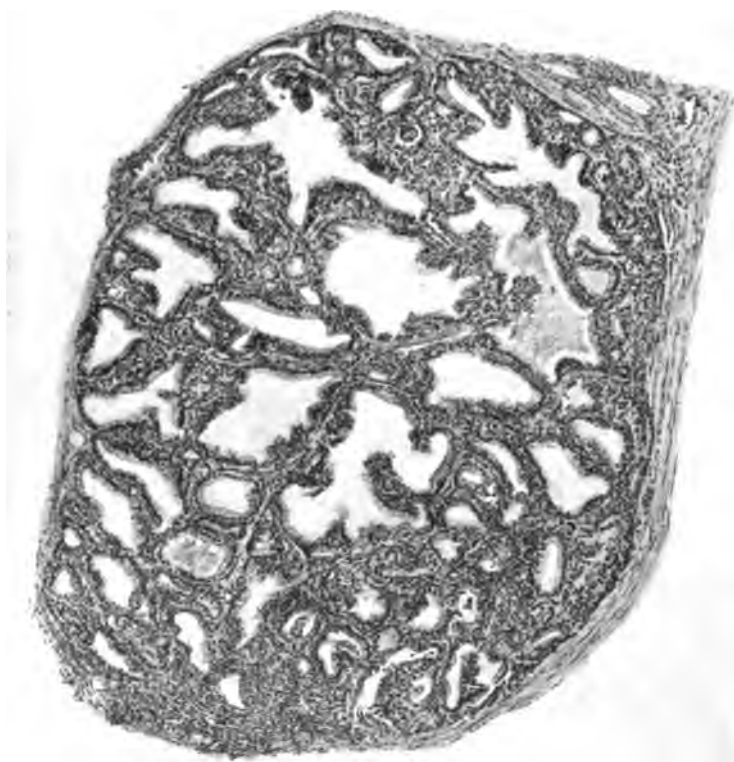


FIG. 5.—Microscopic lesions of the thyroid in exophthalmic goiter.

coma. A similar clinical picture is sometimes observed in grave forms of exophthalmic goiter without operation, and a few cases have been reported in which these phenomena have followed other operations. In the latter group the theory has been advanced that the patients were suffering with latent exophthalmic goiter. Many of these patients have had enlarged thyroids, and a few, after operation, developed exophthalmos and the other characteristic symptoms of this disease. With this latter group I have had no experience. Wells³⁰ reports a case of acute thyroidism following curetting of the uterus.

When the symptoms follow operations upon the thyroid recent experience seems to demonstrate that the intoxication is due to rough handling of the thyroid gland, and not to section and exposure of raw surfaces of thyroid tissue left in the wound.

When these symptoms follow thyroidectomy for lesions of the thyroid other than exophthalmic goiter the prognosis is good. However, when observed after partial removal of the thyroid for Graves's disease, the prognosis is bad.

MYXEDEMA.—This is a late postoperative complication and may appear from months to years after operation. In the clinical picture varying degrees of this condition must be recognized. The lighter cases are usually overlooked. The importance of its recognition is due to the fact that it is usually relieved by the administration of thyroid extract. I am quite convinced that myxedema, the postoperative and other forms, are frequently overlooked when the symptom-complex is not fully developed.³¹

PARATHYROID TUMORS.—MacCallum,³² in reporting a case in his observation gives but two other references.

SIMPLE GOITER.—This term should be confined to a symmetrical enlargement of the entire thyroid gland. The onset usually dates from puberty or pregnancy, and the tumor is rarely observed to begin after 30 years of age. It is the lesion of the thyroid observed endemic in certain localities. Pathologically it differs from normal thyroid tissue chiefly in the fact that there is an increase in the colloid material.

Fig. 2 is a microphotograph of the normal thyroid of a dog. The parathyroid, normal colloid, and young thyroid tissue are shown. Fig. 3 represents the histologic appearance of simple goiter. In the early stage of simple goiter, when the thyroid is rapidly enlarging, it

³⁰ Med. News, p. June 25, 1904, 1290.

³¹ See Lanx, Cachexia and tetania thyreopriva, Centralbl. f. Chir., 1905, xxvii, p. 339.

³² Johns Hopkins Hosp. Bull., March, 1905, vol. xvi., p. 87.

may be associated with general nervous symptoms, now and then palpitation and, rarely, even slight tremor. In this stage incorrect diagnosis of exophthalmic goiter is not infrequently made. In such cases one finds microscopically a large amount of young thyroid tissue.

As the tumor grows older and larger, pressure symptoms develop. Pathologically, in the older tumors, one finds more fibrous tissue, areas of calcification, more or less hemorrhage, larger colloid vesicles, and various forms of colloid degeneration. These changes give rise to a variegated fresh appearance. When the simple goiter has been quiescent as regards growth for a number of years and then suddenly shows rapid enlargement—this, according to Kocher and others who have had large experience, should be considered a positive indication for immediate operation, as the change is suggestive of malignant disease.

The magnificent results and technic of thyroidectomy for simple goiter has been well established by the publications of Kocher. Riedel³³ has a recent communication on this subject. He agrees with Kocher on the use of local anesthesia, urges the prompt removal of an old goiter exhibiting recent growth, and advises that goiter occurring in families with a history of cancer should be subjected to early operation. Duncan³⁴ describes an area of endemic simple goiter in the municipality of Macabebe in the Philippine Islands. Moffit,³⁵ presents an interesting communication on the lesions of the thyroid in California.

EXOPHTHALMIC GOITER.—Dr. Halsted³⁶ in May, 1905, presented before the Johns Hopkins Hospital Medical Society a very complete report on the clinical features of thyroid hypertrophy. He called attention to the interesting fact that one or more of the symptoms usually known as exophthalmic goiter might occur in various lesions of the thyroid—simple goiter, cyst, adenoma, carcinoma, and even “normal” thyroids. No sharp line could be drawn between these individuals and those suffering with extreme hypertrophy. He reported on 46 cases in which these symptoms had been present in varying degrees, with the thyroid lesion. The results of the operative removal were without exception good in simple goiter, cysts, and adenoma, in which the patients exhibited atypical exophthalmic symptoms. In those cases in which the thyroid was the seat of the now well-known exophthalmic hypertrophy, the results of partial thyroidectomy were on

³³ Deutsche med. Woch., 1905, No. 28; Centralbl. f. Chir., 1905, vol. xxxii, p. 1000.

³⁴ Amer. Med., Nov. 18, 1905.

³⁵ Jour. Amer. Med. Assoc., Sept. 16, 1905, vol. xlv., p. 837.

³⁶ Johns Hopkins Hosp. Bull., August 1905, vol. xvi, p. 288.



FIG. 6.—The gross appearances in the fresh state of a cystic thyroid gland.

the whole excellent. There have been a few recurrences. At this time Dr. Halsted stated that the x-ray treatment was being tried.

On the same evening Dr. MacCallum³⁷ discussed the pathologic anatomy of exophthalmic goiter. He called attention to the important fact that the hypertrophy is not always diffuse, but may be present in focal areas only. This hypertrophy in the thyroid of patients suffering with Graves's disease resembles very closely the experimental hypertrophy observed by Halsted after partial removal of the thyroid gland in dogs. Dr. Halsted³⁸ called the condition compensatory hypertrophy. This experimental work was done in 1888. Fig 4 illustrates the advanced compensatory hypertrophy in dogs, and Fig. 5 the picture of advanced exophthalmic hypertrophy in the human thyroid.

Fig. 6 represents the gross appearances in the fresh state of a cystic thyroid gland, and Fig. 7, the gross appearances of the thyroid in a case of exophthalmic goiter.³⁹

At a meeting of the College of Physicians of Philadelphia, January 8 of this year, there was a symposium on exophthalmic goiter. The chief paper of the evening was presented by Dock,⁴⁰ of Ann Arbor. The consensus of opinion at this meeting favored the trial of medical treatment at first. This should consist chiefly of rest, a change from any annoying environment, and regulated diet. No drugs are specific; an ice cap over the precordia is useful. If medical treatment fails partial thyroidectomy is indicated.

The recent reports of surgical treatment record such excellent results of partial thyroidectomy that it must now be considered an establish method of treatment.⁴¹

THE X-RAY TREATMENT OF EXOPHTHALMIC GOITER.—Dr. Baetjer, who has been giving the x-ray exposures at Dr. Halsted's suggestion, informs me that he has had two apparently good results, both in the relief of the general symptoms and in the atrophy of the thyroid enlargement. These cases are too recent to estimate the permanent

³⁷ Ibid., p. 287.

³⁸ Johns Hopkins Hosp. Rep., vol i, 1896, p. 373.

³⁹ Figures 1, 2, 3, 4, 5, 6, and 7 have been reproduced from my article on Cysts of the Thyroid Gland, published in *Surgery, Gynecology, and Obstetrics*, 1905, vol. i, page 113, and the colored plates have been made through the courtesy of the editor of that journal.

⁴⁰ Amer. Med., 1906, vol. xi, page 271.

⁴¹ See Hartley, Ann. of Surgery, July, 1905, vol. xlii, p. 32; Friedehain, Archiv. f. klin. Chir., 1905, vol. lxxvii, p. 917; Centralbl. f. Chir., 1905, vol. xxxii, No. 30, p. 30; Paessler, Mittheilungen a. d. Grenzgeb. d. Med. u. Chir., 1905, vol. xiv, p. 330; and Lessing, Frieie Vereinigung der. Chir. Berlin, Jan. 9, 1905; Centralbl. f. Chir., 1905, vol. xxxii, p. 151.

result. Four other cases are under treatment. Dr. Charles H. Mayo writes me as follows: "I have had much benefit from the x-ray in the treatment of exophthalmic goiter mainly in the preparation for the surgical procedure at a later period, employed in the bad cases, where some patients improved so much that they would not have the operation after the use of the x-ray, they have later relapsed and come back to have the operation upon the gland." Beck⁴² also recommends the combination of excision and x-ray.

Machade,⁴³ and Goerl,⁴⁴ give their recent experience on this method of treatment.

My own experience and the reading of the literature allow the following suggestions as to methods of treatment. Cases of exophthalmic goiter can be divided into three groups. In the first, the clinical picture indicates the most advanced intoxication. These patients are critically ill. All the symptoms are exaggerated. There may be attacks resembling acute postoperative thyroidism. This represents the most advanced stage of the disease.

Fortunately cases of this character are rare. I do not believe operative intervention is justifiable. Medical treatment combined with the use of the x-ray should be tried. Serum treatment should be attempted. The prognosis is grave. So far these patients have died whether subjected to operation or not. In the second group the clinical picture is that of an advanced stage, of a degree between the first group, just described, and the third group, to be described. The immediate results of thyroidectomy in this group are so good and the danger of the operation, if properly performed, relatively so small, that I doubt if it is wise to delay for any trial of medical or x-ray treatment. This should be given after operation for its influence on the portion of the thyroid gland which must be left behind. In the third group the clinical picture indicates a mild form. Medical treatment and x-ray exposure should always be attempted first. A certain number of cases will be permanently cured. In those in which this treatment fails, or in which there is later a recurrence, no apparent harm is done by the delay of the operation. Every patient with a simple goiter, a cyst or adenomatous tumor in which there are symptoms resembling exophthalmic goiter, should be subjected to operative treatment at once. If these general nervous symptoms are really due to the thyroid lesion they will be permanently relieved. However, if the nervous symptoms

⁴² *Centralbl. f. Chir.*, 1905, vol. xxxii, p. 878.

⁴³ *Centralbl. f. Chir.* 1905, vol. xxxii, p. 1253.

⁴⁴ *Centralbl. f. Chir.*, 1905, vol. xxxii, p. 765.



FIG. 7.—The gross appearances in the fresh state of a thyroid gland in exophthalmic goiter.

are only part of a general neurosis, and not dependent upon thyroid changes, the surgeon and patient will be disappointed in the result. Clinically it is often difficult to differentiate the two groups.

MALIGNANT TUMORS OF THE THYROID.—Every asymmetrical enlargement of the thyroid in an individual over 30 years of age should be subjected to immediate operative removal. It is impossible to differentiate clinically the early stage of carcinoma from a benign tumor. If one delays until the malignant tumor has assumed a clinical picture definitely indicating its malignancy there is little or no hope from a radical operation.⁴⁵ Goebel⁴⁶ and Delore⁴⁷ report interesting observations on carcinoma of the thyroid. Sarcoma of the thyroid is a very rare lesion. I have observed but one case among 148 diseases of the thyroid glands. Dr. W. D. Cutler has just brought me a specimen of a sarcoma of the thyroid, recently removed in the French Hospital, New York City. Both these cases were fibro-spindle-cell sarcoma and inoperable. Lartigau,⁴⁸ in 1901 contributed a very complete article on this subject with the literature. It is more uncommon than carcinoma, is usually observed after 40, quite frequently associated with simple goiter. The neoplasm is usually a round-cell or spindle-cell sarcoma; hemangiosarcoma and lymphangiosarcoma are very rare. No permanent cures are recorded.

LESIONS OF THE ACCESSORY GLANDS.—Murphy,⁴⁹ of Chicago, gives a very complete review of this subject. He confines his remarks chiefly to the superior accessory thyroid. These glands are apparently subjected to the same pathologic possibilities as the thyroid gland proper, and should receive the same treatment. The most important fact to be remembered is that the single accessory thyroid may represent all the thyroid tissues. If this is true, myxedema will follow its extirpation. Murphy found this recorded in five out of thirty-nine cases. Therefore, at the operation one should always demonstrate the presence of the normal thyroid gland. Tereschenkow⁵⁰ considers the multilocular branchial cysts and the adenocystoma of the accessory thyroid glands.

ABDOMINAL SURGERY

In view of the increasing number of abdominal operations for relatively benign lesions, in which the decision as to the absolute neces-

⁴⁵ See Surgery, Gynecology and Obstetrics, Aug., 1905, and February, 1906.

⁴⁶ Deutsche Zeitschr. für Chir., 1905, vol. lxxxiii, p. 300.

⁴⁷ Centralbl. f. Chir., 1905, vol. xxxii, p. 194.

⁴⁸ Amer. Jour. Med. Sciences, Aug., 1905., p. 156.

⁴⁹ Jour. Amer. Med. Assoc., Dec. 16, 1905, vol. xlv., p. 1854.

⁵⁰ Centralbl. f. Chir., 1905, vol. xxxii, p. 178.

sity of an operation may yet be considered somewhat doubtful, it is very important for surgeons to bear in mind those postoperative complications which may be fatal; for example, gastric hemorrhage, acute dilatation of the stomach (gastro-mesenteric ileus, Zade), peptic ulcer following gastro-jejunostomy, and intestinal obstruction. All of these lesions have, during the past year, received considerable attention.

GASTRIC HEMORRHAGE AFTER LAPAROTOMY.—In the *INTERNATIONAL CLINICS* for April, 1904, I discussed this subject, beginning with von Eiselsberg's communication in 1899, and called attention to the fact that, in some of the cases, the hemorrhage was due to the presence of a gastric ulcer with latent symptoms in which, without much doubt, the fatal hemorrhage was excited by the traumatism of the operation, the vomiting of the anesthesia. This view has been confirmed by autopsy in a certain number of cases. When the evidence of an old gastric ulcer is absent, and only slight recent hemorrhagic erosions are found, they are explained by von Eiselsberg and others as due to an embolism plugging a gastric artery from a thrombus somewhere in the abdomen, usually the omentum. Since my previous review, in 1904, an extensive communication has appeared by Busse.⁵¹ I am able to discuss this in detail from an excellent review made for me by Mr. Henry Beeuwkes, of the fourth-year medical class. Busse was able to collect 96 cases, including 14 from von Eiselsberg's clinic. Gastric hemorrhage was observed after the following operations: Herniæ of all varieties, 27 cases; stomach and intestines, 25 cases; in this group the majority of operations were performed for appendicitis (17), and only one on the stomach itself; the next most frequent were operations on the gall-bladder and bile ducts—10 cases; in the remaining operations the number of instances of this complication reported in the literature has varied from one to six. They are as follows in order of frequency: Hysterectomy, kidney and bladder, adenoids (here the blood may have been swallowed), ovarian tumors, exploratory laparotomy, retroperitoneal tumors, echinococcus cyst, pancreatic abscess, tubercular peritonitis, pelvic abscess, abdominal abscess, extrauterine pregnancy. In none of these cases was this gastric hemorrhage present before operation. The positive proof of the hemorrhage was the presence of blood either in the vomitus or the stomach washings; in addition, in some cases blood was found in the stool. Age and sex had no apparent influence. As to the condition of the patient before operation, eight are described as very corpulent, in eleven there were symptoms quite suggestive of the possibility of gastric ulcer; in other cases this was a

⁵¹ *Archiv f. klin. Chir.*, 1905, vol. lxxvi, p. 122.

probability; there was a history of jaundice in ten cases; no positive relation to anemia was demonstrable, but its possibility is suggested; ten per cent. of the cases were operations on the genito-urinary tracts; in these the influence of uremia as a factor in increasing the severity of the postanesthetic vomiting must be considered. The poisonous effects of chloroform and its relation to thrombosis is noted; the possibility of trichinosis and its association with gastric ulcer are mentioned. In intestinal obstruction, ulcers may form in the stomach and duodenum. The possibility of hemorrhage into the intestinal tract in strangulated hernia is well known. As to local predisposing causes, he discusses the various etiologic factors which affect the circulation of the stomach and lead to erosion. It is difficult to estimate the exact relation of vomiting to gastric hemorrhage; if this is severe von Eiselsberg and others consider it a predisposing factor. Traumatism during the laparotomy must be considered a positive factor, sufficient to produce gastric or duodenal ulcers independent of other causes. Such a traumatism may produce an ulcer in a perfectly healthy stomach. Busse, following the views of his chief, believes that the ligation of blood-vessels in the abdomen is by far the most important single factor. This has been demonstrated experimentally; the ligature leads to a thrombus which may produce an embolus in the wall of the stomach. In thirty-four of his ninety-six cases omental or mesentery vessels were ligated, and the probabilities are that this took place in other cases. According to these authorities a gastric or duodenal ulcer is possible whether the embolus is septic or not. The septic embolus is naturally more dangerous. Inflammation in some part of the abdomen was a factor in twenty-one cases before operation.

As to the number of hemorrhages, in six cases there was but one, in fourteen two, in fourteen three to five hemorrhages; in single cases there were numerous hemorrhages (from six to nine); in but ten cases did the hemorrhage take place after the third day. The mortality has been fifty-five per cent.

There were thirty-five autopsies among the ninety-six cases. In the majority of cases the mucous membrane of the stomach and intestines showed areas of hemorrhagic congestion; in seventeen there were typical ulcers, in nine hemorrhagic erosions and infarcts; in four little or no change was found in the mucous membrane of the stomach or intestines; in only four cases is thrombosis of the mesenteric vessels noted. In ten cases the ulcers were only in the duodenum, in one in the small intestine, in one in the large intestine. In the remaining cases there was an ulcer of the stomach, in four of these also in the duodenum. The

stomach ulcer was present in the lesser curvature in the majority of instances.

The treatment has been unsatisfactory. It should consist of absolute rest, no food, ice to the stomach, morphin hypodermatically, salt infusions subcutaneously. Busse recommends styptics and injections of gelatin. The treatment, therefore, is on the same principle as that employed in the medical treatment of a gastric ulcer. According to Busse, operation should be the last resort. This complication must, therefore, be always borne in mind. The patient should be studied most critically for the possibility of a latent gastric ulcer. Manipulations in the abdominal operation should be most gentle, and vessels should be ligated with care. Omental ligature should not be made unnecessarily.

Dr. E. Butterfield, of the University of Michigan, writes me that she is about to report a fatal case of perforating gastric ulcer following appendectomy for gangrenous appendicitis. At the autopsy Dr. Butterfield was unable to find any thrombus or evidence of embolism in the wall of the stomach. Dr. Osler has just described to me a similar case observed recently in Canada. The operation was performed on a clinical diagnosis of chronic appendicitis; the postoperative gastric hemorrhage was fatal. I have carefully examined the records of the surgical clinic of Dr. Halsted and am unable to find any fatal cases; the only severe case of gastric hemorrhage which fortunately did not prove fatal I mentioned in my previous remarks on this subject; it was after an operation for gall-stone in the common duct; the patient was intensely jaundiced, and the liver was cirrhotic. Busse does not consider the relation of cirrhosis of the liver to gastric hemorrhage, a factor which, I think, should be investigated. One also must think of the rare cases of varicose veins of the esophagus. I have just had a personal communication from a colleague; he performed gastroenterostomy for what appeared to be marked hemorrhage from a gastric ulcer; the bloody vomiting was not relieved; the autopsy demonstrated a varicose condition of the veins of the esophagus and cardiac end of the stomach. I have seen an autopsy on a somewhat similar case.

Payr⁵² at the last German Surgical Congress described seven cases of appendicitis with postoperative gastric hemorrhage. Many of these cases showed thrombosis of the omental vessels with emboli in the wall of the stomach. In a few cases there were symptoms suggesting gastric ulcer before operation.

Purves⁵³ in addition to discussing the literature, all of which has

⁵² Münchener med. Woch., 1905, p. 793.

⁵³ Edinburgh Med. Jour., 1902, vol. xi, p. 237.

already been considered, describes eleven cases in detail from the clinics of Annandale and Chiene and MacGillivray. He is very much inclined to the view that sepsis plays an important part. In view of the absence of autopsies in many of his cases, the possibility of peritonitis in some, I do not think all of his observations should be considered typical. Death took place in eight of these eleven cases.

POSTOPERATIVE ACUTE DILATATION OF THE STOMACH.—This complication, less difficult to recognize than to treat successfully, is another recent influence which demonstrates that many patients subjected to operation do not always have the careful clinical examination which might indicate a lesion of the stomach.

Zade⁵⁴ gives the most recent communication, with the literature on this subject. This authority is of the opinion that many of these patients suffer from chronic dilatation or some form of motor insufficiency of the stomach before operation. This fact might be elicited if a more careful history and examination were made. The acute dilatation is due to the effect of anesthesia. The dilated stomach as it extends lower in the abdomen presses the small intestines into the pelvis. This shifting of viscera puts the mesentery in tension, and a kink is produced in the duodenum at the duodeno-jejunal junction, causing definite obstruction. This explains the mechanism in the majority of cases and has led Zade to suggest the term gastro-mesenteric ileus. The acute dilatation of the stomach is therefore the primary condition, the kink in the duodenum the secondary.

The complication is observed chiefly after laparotomies, more especially after operations on the gall-bladder and its ducts, less frequently after operations on the stomach. Finney has observed one such complication after his gastroduodenostomy. In a few instances the complication has taken place after operations under anesthesia not on the abdomen, and in one or two cases the acute dilatation of the stomach has been observed after placing a kyphotic patient in a plaster cast, without anesthesia.

The symptoms of this complication generally appear quickly after the operation; it has, however, been observed as late as ten days. There is epigastric distress and distention; this is associated with characteristic depression difficult, perhaps, to differentiate from peritonitis. The character of the vomiting differs, which has been explained to a certain extent by the experimental work of Kelling.⁵⁵ The vomiting may be copious and at infrequent intervals; it may be slight (regurgitation) at

⁵⁴ Beiträge zur klin. Chir., 1905, vol. lxiv, p. 388.

⁵⁵ Archiv. f. klin. Chir., 1901, vol. lxvi, p. 393.

frequent intervals; in a few cases vomiting is not a marked feature. This variation in vomiting is explained by Kelling as due to different anatomic factors which are variously influenced by the stomach distended with fluid and gas. The vomitus has the odor and color of the contents of the duodenum. In a few cases the rapid excoriation of the skin and mucous membrane about the mouth indicate the presence of pancreatic juice.

Treatment should be preventive and consist of careful feeding, and stomach-washing previous to operation in those cases in which the history and examination indicate some form of gastric disorder.

After operation the stomach should be washed out, and these patients should have restricted diet for some days after operation. When the complication takes place the most important therapeutic agent is the stomach-tube to thoroughly evacuate the gastric accumulation; this should be repeated at frequent intervals until the mechanical obstruction is relieved and the dilatation has subsided. In one of Kelling's cases this treatment was carried on for ten days. One should not allow even the most critical condition of the patient to deter one from the use of the stomach-tube. Zade recommends Schnitzler's position. In this the patient is placed in a knee-elbow position for fifteen minutes every two hours: in the interval the patient lies in the left lateral position or on the abdomen. Other authorities have not much confidence in this position. When treatment does not give results within twenty-four hours, Zade and others recommend operation—jejunostomy. As a matter of fact, none of the operative cases have recovered. This may be due to the late intervention which has been the rule. In Zade's patient the acute dilatation followed a posterior retrocolic gastroenterostomy for an indurated pyloric tumor associated with a chronically dilated stomach. The patient died on the third day.

Neck⁶⁶ contributes a collective review. He finds sixty-four cases; forty-seven died from a few hours to thirteen days after the beginning of the symptoms. Among the seventeen recoveries none were subjected to operation. Neck adds nothing to the clinical picture and treatment as outlined by Zade. He agrees that the principal factor is the stomach-tube. Results following Schnitzler's position are not sufficient evidence to force these patients, critically ill and in great discomfort, into the awkward position. Without any definite evidence for support, Neck recommends the position of the patient on the back with elevated pelvis, and, if treatment fails, gastroenterostomy.

⁶⁶ *Centralbl. f. d. Grenzgebiete der Med. u. Chir.*, 1905, vol. viii, p. 529.

Neck's review is of chief interest on account of the summary of autopsy findings in forty-four instances, from which he concludes that although the explanation of Zade is valid in the majority of cases, the condition may be due to many causes, the duodenal obstruction may be in other portions of the duodenum or in the pylorus, or, in a few instances, below the duodeno-jejunal junction. He agrees, however, with the majority of authorities that the acute dilatation of the stomach is the primary lesion and that it seldom takes place except in individuals suffering with some gastric lesion which weakens its motor function.

PEPTIC ULCER AFTER GASTRODUODENOSTOMY.—I referred to this complication in the *INTERNATIONAL CLINICS* for April, 1904; at that time Brodnitz had collected fifteen cases. The most recent contribution is by Kaufmann.⁵⁷ However, he reports but a single observation and refers to Tiegel's communication of the previous year.⁵⁸ The latter contribution gives the details of the twenty-two cases then reported in the literature and includes six observed in von Mikuliez's clinic in Breslau. The majority of these patients were men and over thirty years of age; the youngest case was an infant of four months (von Mikuliez). The lesion of the stomach was benign, usually associated with pyloric stenosis and dilatation of the stomach; one a congenital stenosis, and one an ulcer of the duodenum. Careful stomach analysis before and after operation is not recorded in the majority of cases. As a rule there was hyperacidity, but the complication has followed when hyperacidity was not present. The pathology of the peptic ulcer of the jejunum does not differ from that of the ulcer of the stomach or duodenum. Clinically there are no symptoms from this jejunal ulcer until its base has excited local peritonitis or perforated into the free peritoneal cavity. In the latter instance the clinical picture begins with the symptoms of acute peritonitis, in the former of localized peritonitis and abscess. When the inflammatory process is localized the abscess or ulcer may perforate into an adherent hollow viscus or through the abdominal wall with the formation of a fistula.

In eight patients the perforation took place into the free peritoneal cavity and the first symptoms were those of peritonitis. Goebel's two patients recovered, the others died. In Kocher's case a diagnosis of appendicitis was made and the appendix removed; the autopsy revealed the perforating ulcer. In the remaining cases the symptoms were localized and subacute, as a rule situated to the left, and lower in the

⁵⁷ *Med. News*, July 8, 1905; *Mittheilungen a. d. Grenzgebieten der Med. u. Chir.*, 1905, vol. xv, p. 151.

⁵⁸ *Mittheilungen a. d. Grenzgebieten d. Med. u. Chir.*, 1904, vol. xiii, p. 897.

abdomen than is usual in gastric ulcer. Frequently the inflammatory tumor could be palpated.

The symptoms of secondary jejunal ulcer have been observed between ten days and eight years after gastroenterostomy; ten cases within the first year, five between the second and eighth year. As to treatment, of course, immediate laparotomy and suture are indicated in the cases with symptoms of perforation; in the larger group without symptoms of general peritonitis, operative treatment, that is secondary operation, has not given as good results as medical treatment. Peptic ulcer of the jejunum has been observed chiefly after anterior gastroenterostomy, but in five cases the anastomosis was posterior; in all of these cases a long loop was used; so far no case has been reported in which the anastomosis has been posterior with a short loop.

Kaufmann's case is of interest because there was not only an ulcer, but from the fact that the original gastroenterostomy opening had closed and a secondary fistula had formed between the jejunum and the colon and the colon and the stomach. This patient died after a secondary operation to close the fistula.

POSTOPERATIVE TETANY.—Gastric tetany as a rule is present before operation. It is observed but rarely in certain forms of stenosis of the pylorus with great dilatation. The symptoms are explained as the effect of toxins produced by fermentation in the retained gastric secretion. From the work of McCallum, of Baltimore, and others it is now known that the acute tetany following operations on the thyroid are due to the injury or the removal of the parathyroid gland, and not to the injury or removal of the thyroid itself. McCallum is of the opinion that in gastric tetany the toxins affect the parathyroid gland and thus give rise to a similar result as that observed after its removal.

The case reported by Herman Fischer⁵⁹ is of interest not only because of the rare lesion of the stomach—a fibrolipoma, but on account of the postoperative symptoms of tetany from which the patient recovered. The patient was a female aged 37; at the operation a fibrolipoma was removed from the lesser curvature, necessitating a V-shaped resection of the stomach. This operative manipulation may have affected the motor function of the stomach; the symptoms of tetany began on the seventeenth day; the attacks were light and seemed to be associated with definite dilatation of the stomach, which began with the administration of solid food.

⁵⁹ Archiv f. klin. Chir., 1905, vol. lxxvii, p. 845; Ann. of Surgery, Oct. 1905, vol. xlii, p. 583.

BENIGN LESIONS OF THE STOMACH.—The subject of the surgical treatment of benign lesions of the stomach was one of the chief topics at the first congress of the International Surgical Society,⁶⁰ held at Brussels, September 18 to 22, 1905. At the recent meetings of the German Surgical Congress, the British Medical Association, the American Surgical Association, and the Surgical Section of the American Medical Association, men of great experience contributed to the discussion of this subject.

Czerny, at the International Surgical Congress, expressed a sentiment which, I think, should prevail and which if it does, in all communities, would be one of the greatest forces toward progress. He said that he attributed his good results more to the coöperation of his medical colleagues than any other factor. Unfortunately in many other contributions expressions are found against the internal clinician, that, whether they be exaggerated or not, have an undesirable influence. Malignant disease of the stomach may be considered a purely surgical lesion. If surgeons and physicians worked together harmoniously, carcinoma of the stomach undoubtedly would be subjected to earlier operative intervention. Benign lesions are border-line cases. They must be studied together. The physician must feel his responsibility in following his cases treated medically for years, and collect his large material, for a basis of comparative study with the results of surgery. Surgeons can be criticised as justly as physicians for basing the results of their operative interventions on the immediate mortality and the condition of the patient a few months later. If surgeons complain that physicians procrastinate and refer benign lesions of the stomach at too late a period, physicians, with equal justice, can criticise that many patients are subjected to surgical intervention after too cursory an examination and without the benefit of a previous medical treatment. It is quite possible in many of these cases that the permanent results would have been just as good after medical treatment, which has not the operative mortality and postoperative complications. This is true especially of gastroenterostomy. There is no reason to suppose that the immediate mortality and postoperative complications of gastroenterostomy on a normal stomach in patients exhibiting suggestive symptoms of a gastric lesion will be very great. The greater number of such cases added to surgical statistics, of course, improves the apparent results. However, this is hardly fair when a comparison is made with medical treatment of cases in which this treatment is justifiable. In addition, every death, immediate or postoperative, in this group of

⁶⁰ Review in *Centralbl. f. Chir.*, 1905, vol. xxxii, p. 1283-1287.

surgical cases is unnecessary. It may be lost sight of in the large material, but nevertheless, when properly estimated, it represents fatal, meddlesome surgery.

There are certain lesions of the stomach in which surgical intervention is always justifiable—the sooner the better: pyloric stenosis, no matter what its cause, and palpable tumors; all forms of chronic gastric ulcers which do not react to proper medical treatment; perforation; all cases in which the gastric symptoms are doubtful and in which the possibility of malignant disease cannot be excluded. In this latter group exploratory laparotomy is not only justifiable, but imperative. In this way only will malignant disease of the stomach become curable.

GASTRIC NEUROSES.—The majority of authorities, both medical and surgical, are emphatic in the statement that operations on the stomach are contraindicated in all forms of the so-called gastric neuroses. The only authority who takes exception to this statement is Kocher, of Bern, who, however, simply states that gastroduodenostomy (an operation similar to Finney's) is best for the neuropathic lesions. Quite frequently it is difficult and sometimes impossible to make a clinical diagnosis of gastric neurosis, and for this reason, at least until our methods of diagnosis have improved, there is bound to be a certain number of exploratory laparotomies in this group. The surgeon at the operation, when he finds no lesion of the stomach or the duodenum, or of the other abdominal viscera, should at least *not* do gastroenterostomy. Whether he should follow Kocher's advice, I am not prepared to say. These cases should be studied most thoroughly in partnership with our medical colleagues. I have had a recent experience of this character. The patient, a tailor, gave a history of gastric symptoms of six years' duration: epigastric pain and nausea without, however, much loss of weight. The examination of the stomach was negative as far as any change in secretion or motor function. Proper medical treatment gave no relief. The patient was anxious to have the benefit of an operation. At the operation I could find no lesion of the stomach or duodenum; the gall-bladder was tense, and it was difficult to empty its contents; the aspirated bile was unusually dark, thick and viscid. Cholecystostomy was performed; the drainage was maintained ten days; the patient left the hospital in three weeks and returned to his hard work in a sweat-shop. He remained well five months. I have just been informed that he is again suffering with his old symptoms.

GASTROPTOSIS.—It is rather interesting to note that the larger

one's individual experience in surgery of the stomach the less frequent are one's operative interventions for this lesion. Dr. William J. Mayo writes me that he has had very little experience. He views gastropotosis as part of a neurasthenic state. Over sixty per cent. of his cases of movable kidney have this lesion. Mayo has operated for gastropotosis only occasionally and then as secondary to some other operation. He advises to suture the lesser curvature of the stomach two inches from the pylorus to the lower border of the suspensory ligament of the liver with several mattress-sutures of linen. This gives a movable support. In the International Congress, Rovsing, of Copenhagen, was the only one to advocate operations for gastropotosis. He reported fifty-five cases. He objected to Bier's method of shortening the mesentery to the anterior curvature, because it pulled the pylorus to the cardia.

At the present time, therefore, surgery has nothing to recommend as better than even the unsatisfactory medical treatment of gastric neuroses and gastropotosis. As I stated before, I am convinced that in this group a certain number of exploratory operations should be done; first, because not infrequently some organic lesion is found which can be remedied by surgery; second, because it is not always possible to differentiate. At the operation, however, the surgeon should be careful to restrict his intervention, if the findings are negative, either to simple laparotomy, or to some simple operative procedure that experience has demonstrated not to be dangerous,—for example, cholecystostomy or gastroduodenostomy, but not gastroenterostomy or any extensive plastic operation on the stomach.

SIMPLE GASTRIC ULCER.—The recent communications from medical men on large series of cases of this character have demonstrated that their results in uncomplicated cases are too good to justify surgical intervention until medical treatment has been given a fair trial. The few cases that I have seen of simple ulcer of the stomach without complications, and which I have referred to my medical colleagues, have all reacted quickly to medical treatment and so far, under careful observation, have remained well. The experience of Friedenwald, of Baltimore, reported recently before the Medical and Chirurgical Faculty of Maryland, was unusually favorable, and as this physician cannot be criticised in his attitude toward lesions of the stomach, because, during the same time, he has referred to surgeons all of his cases in which there were any complications, it is fair to assume that his results must be considered as a fair example of what internal therapeutics can do for simple gastric ulcer. The reports from the hospitals in Boston, and

the German clinics, and the statements of surgeons of the largest experience, all favor medical treatment. The pendulum, therefore, has turned. The view expressed some two years ago, that repeated gastric hemorrhages are an indication for operation, does not hold good to-day. The decision as to operation in the presence of hemorrhage is one of the most difficult problems to settle. The consensus of opinion is against any operation during hemorrhage. If the repeated hemorrhages produce a secondary anemia and medical treatment fails, it is the present view that gastroenterostomy should be performed without any search for the bleeding ulcer. The earlier results were much more brilliant in these cases than the present accumulated experience.

THE CHOICE OF OPERATION FOR BENIGN LESIONS OF THE STOMACH.
—In many cases the abdomen will be opened without a positive clinical diagnosis. Even when the clinical diagnosis allows a fairly positive conclusion, the surgeon must be influenced by his examination of the viscera. If the stomach is apparently normal and the clinical history suggestive of a neurosis, he must decide between nothing or following Kocher's recommendation of gastroduodenostomy. If there is a simple gastropptosis, whatever he does will be more or less experimental. If there is definite evidence of ulcer he must decide between local excision, pylorotomy, gastroenterostomy, and gastroduodenostomy (Finney's method). The best recent discussion in American literature is by William J. Mayo.⁶¹ Mayo in the majority of cases prefers a posterior gastroenterostomy; he uses a short loop, holds the intestine and stomach with clamps, and makes the anastomosis by suture. Figs. 8, 9, 10, and 11 illustrate better than words his most recent method of gastroenterostomy. There is, however, a growing tendency in favor of pylorotomy in chronic ulcer with tumor formation near the pylorus. This is recommended by many authorities when the tumor is fairly movable, or one in which the adhesions are not sufficient to add to the risk of the operative procedure. In the absence of a chronic ulcer with tumor formation, I notice that American, English, German, and French surgeons are performing more and more gastroduodenostomy by Finney's or some other methods. Other plastic operations on the pylorus are growing less frequent. My own small experience and the reading of the literature incline me more and more toward pylorotomy in suitable cases, or Finney's gastroduodenostomy. The problems are by no means settled. Many of the reports by surgeons can be criticised for the fact that surgeons base their results chiefly on immediate mortality and percentage of secondary operations. Each case should be studied on its merits, and the exact

⁶¹ Ann. of Surg., Nov., 1905, vol. xlii, p. 641.



FIG. 8.—Showing posterior wall of the stomach drawn through a rent in the transverse mesocolon. Note the slight separation of the gastrocolic omentum from its attachment to the stomach, permitting the anterior wall of the stomach to appear, and insuring drainage at the lowermost level. The black lines mark the site of the proposed anastomosis; the jejunum shows at its origin. (From Mayo, *Annals of Surgery*, 1905, vol. xlii, p. 641.)



FIG. 9.—The forceps in place and the anastomosis half completed by the suture.
(From Mayo.)



FIG. 10.—The completed operation from behind. The margin of the torn mesocolon is attached by several interrupted sutures to the line of union. (From Mayo.)



FIG. 11.—The completed operation from in front. The anastomotic opening shows through as a darkened area on the posterior wall. Note that it goes to the bottom of the gastric cavity and slightly anterior, as indicated by the suture line in the omental attachment. (From Mayo.)

condition of the patient before operation should be compared with that months and years after operation. I sincerely believe that the value of such surgical reports would be greatly enhanced if surgeons left to their medical colleagues the judgment as to the comparative difference in symptoms before and after operation.

CARCINOMA OF THE STOMACH.—This is a pretty hopeless subject. Recent communications show a decided preference for an attempted pylorotomy. The immediate mortality may be a little larger, but the subsequent comfort and the duration of the relief are sufficiently better to justify the slight added risk. The best exponent of this procedure is Kelling,⁶² of Dresden. Permanent cures are very rare. It is very important, however, for surgeons to remember that the greater number of cured cases reported in the literature are those in which the stomach tumor has been large, of a comparatively long duration, and pretty definite clinical history and picture. Some of these tumors have been adherent. The permanent result has been due to the fact that the tumors have proved to be of a relatively low grade of malignancy—a colloid adenocarcinoma. This observation is an additional factor to justify pylorotomy. Doubtful cases of ulcer with tumor or induration should be given the benefit of the doubt and resected. There is a sufficient number of cases in the literature to demonstrate that it is absolutely impossible to make a differential diagnosis clinically or at the operation between ulcer and cancer of the stomach.

APPENDICITIS.—The problems in this branch of surgery are by no means settled. Both surgeons and physicians are interested in what shall be considered the minimum symptoms which justify an early operation in the acute stage. When patients are seen between attacks in which an abdominal examination is negative it is very important to learn what are the minimum facts in the clinical history that allow a diagnosis of chronic appendicitis and justify an operation for the removal of the appendix.

The problem next in interest is that in regard to the proper treatment of a localizing abscess on the one hand, or a general peritonitis on the other. In the last two years there has been a renewal of interest in this subject, which has too voluminous a literature. The contributions are characterized by a larger experience, more accurate and careful clinical and pathologic study, less dramatic statements, and more judicious conclusions.

Apparently there is no question as to the propriety of early operation in acute appendicitis. To be able to expose the appendix through

⁶² Archiv f. klin. Chir., 1904, vol. lxxv, p. 229.

a McBurney incision, to remove the organ when it is free, before it is gangrenous, perforated, or distended with pus, and before any marked infection of the local or general peritoneal cavity has taken place, is ideal. Such operations are simple; the wound can be closed without drainage; the immediate mortality and postoperative complications of such an operative procedure are so small that the danger of delay is immensely greater than any danger of the operation. The only problem to be settled is, what are the minimal local and general symptoms which will allow a diagnosis in this early stage. Although not many, there are other lesions, both within and without the abdomen, that exhibit a clinical picture suggesting appendicitis. I am inclined to think that the general profession as a whole delays operative procedure in acute appendicitis far beyond the stage of minimal symptoms. This delay has its mortality. On the other hand, a few fatal cases give rise to an anxiety in the minds of both the physician and the surgeon that may precipitate events in their next cases and perhaps lead to an unnecessary operation. Carefully investigated, the diagnosis of early appendicitis is not difficult. Any acute abdominal pain, general or local, of a severity which makes the patient cry for morphin hypodermically should be regarded with suspicion. Morphin, or any drug of like effect, should not be given unless the clinical picture positively indicates a gall-bladder or renal stone. Nothing should be done to relieve the pain until a pretty certain diagnosis can be made for or against an operative lesion.

In deciding as to an operation local muscle rigidity or spasm is the most important single local sign. This, associated with a slight rise of temperature, is a sufficient indication for operation. Properly interpreted, the leukocyte count will be found to be of great value. The decision as to operation between attacks is even more difficult. Accumulated experience of carefully studied cases is increasing the number of patients relieved by appendectomy of vague abdominal symptoms frequently diagnosed neurasthenia.

The most difficult problem to investigate from the literature is that in regard to the treatment of a localizing abscess and beginning peritonitis. Numerous authorities favor delay when a patient with acute appendicitis is seen after forty-eight hours and the symptoms suggest the early stage of a localizing abscess. They argue that operation during this stage is more dangerous than delay. After a careful investigation of my own experience and that of my colleagues I could not get a single fact to justify delay in these cases. It is quite true that perhaps the majority of abscesses localize themselves, and can be opened later by incision and drainage without opening the peritoneal cavity. On the

other hand, a considerable number do not show this favorable tendency, but give rise to secondary peritonitis. In the so-called localizing stage of an abscess it is impossible to differentiate the two groups. The mortality of operations in this stage is second to that of peritonitis, but my investigations seem to prove that the danger of delay is far greater than the danger of immediate operation. That is, this investigation confirms our previous conclusions that immediate operation is indicated in every case of acute appendicitis; no matter at what delayed stage the surgeon may have the misfortune to see the patient, it is his duty to operate.

The term general peritonitis covers such a multitude of peritoneal conditions that it is very difficult to make a comparative study of the results of different non-operative and operative treatments. Peritonitis is frequently diagnosed clinically and not found at the operation. It is also not infrequently not suspected clinically and found at the operation. Different authorities use the term general peritonitis for different peritoneal appearances. The more a single authority restricts the term general peritonitis to a definite pathologic picture associated with the presence of bacteria in the peritoneal exudate, the larger is his mortality, and the reverse is also true. It is remarkable, that in some cases of appendicitis with or without abscess the extensive fluid or fibrinous peritoneal exudate may be sterile. These cases recover. The mortality associated with a peritoneal inflammation and exudate is dependent, first, upon the presence of bacteria; then upon the nature and virulence of the organisms. After this the duration of the bacterial infection is an important element. The prognosis is very much better if there is no distention. All of these factors play a greater part in prognosis than any method of treatment.

The Relation of Appendicitis to General Infectious Diseases.—Adrian,⁸⁸ from a clinical and experimental study which is very suggestive, concludes that appendicitis has a definite relation to infectious diseases. It is well known that the wall of the appendix contains a large quantity of lymphoid tissue. This becomes infected by way of the circulation or lymphatics, and gives rise to an inflammation that interferes with the motor function of the appendix and produces a local anatomic condition that lowers the resistance of the tissues and inhibits the power of the appendix to get rid of its contents. Fecal concretions then become the principal predisposing factor. This investigation is of no practical importance in the diagnosis of appendicitis, but it seems

⁸⁸ Mittheilungen a. d. Grenzgeb. d. Med. u. Chir., 1901, vol. vii, p. 407.

to explain the increasing numbers of this disease, the almost epidemic outbreaks in certain localities at certain times, the relation of appendicitis to influenza, tonsillitis, acute articular rheumatism, and so forth. A recent investigation, somewhat on the same lines, has been published by Haim.⁶⁴

The Explanation of the Hemorrhage in the Wall of the Appendix.—Lauenstein and Revenstorf⁶⁵ conclude from their gross and microscopic study that these areas of hemorrhage in acute and chronic appendicitis are secondary to the inflammatory process and explained by a sudden shutting off of the circulation. The hemorrhages are rare in the chronic inflammation, frequent in the acute. They occur in the early stage of the inflammatory process. Mechanical injury due to the concretion is an infrequent factor. Since reading this article a number of cases of appendicitis have been studied microscopically with this point in view. Apparently the views of these authors are correct.

Appendicitis in the Stump of the Amputated Appendix.—Fischl's⁶⁶ communication is of great interest. He has observed five cases in which, after appendectomy in the usual way and with closure of the wound, the patients at various intervals after operation had acute abdominal attacks, not very severe, which would have been diagnosed appendicitis but for the previous appendectomy. All the patients recovered without operation. He explains the attack on the assumption that there was a slight inflammation in the inverted stump. He refers to a few other reported cases. There is no doubt that now and then, usually within the first months after operation, patients do have such attacks.

Benign Tumors of the Appendix.—Monnier⁶⁷ reports a very interesting case. At the operation there was general peritonitis from a non-localized abscess due to a perforated appendix. The appendix was 8 cm. long, and near the cecal end there was a tumor 3 cm. in diameter, which proved to be fibromyxoma. The tumor acted like a concretion, producing obstruction. This was followed by distention of the distal portion with infected material and perforation of the appendix. The patient was aged twenty-nine, and the attack was apparently the first. In the recent monograph on appendicitis by Kelly and Hurdon there are reported one case of fibroma, one case of myxoma, and three cases of fibromyoma. The fibroma presented itself clinically as an abdominal

⁶⁴ Archiv. f. klin. Chir., 1905, vol. lxxviii, p. 369, and vol. lxxx, p. 497.

⁶⁵ Deutsche Zeitschr. f. Chir., vol. lxxvii, p. 405-6.

⁶⁶ Centralbl. f. Chir., 1905, vol. xxxii, p. 475.

⁶⁷ Centralbl. f. Chir., 1905, vol. xxxii, p. 474.

tumor without any symptoms suggesting appendicitis; the tumor was situated between the layers of the mesentery of the appendix; it was removed without difficulty with the appendix by Dr. Kelly. The case of myxoma gave a history of two attacks of appendicitis and was subjected to operation between attacks; in this case the tumor was situated in the lumen of the appendix, the size of a bean, and made a partial stricture. The fibromyoma was described by Dr. A. O. J. Kelly,⁶⁸ and was situated in the wall of the appendix.

Diverticulum of the Appendix.—There are two recent reports on this rare possibility—one from the surgical clinic of von Bruns in Tübingen, by von Bruns,⁶⁹ and the other by Lejars and Ménétier.⁷⁰ Both articles are well illustrated with gross and microscopic pictures; each has observed a number of cases, eight in von Bruns's clinic, and three at the Hôpital Tenon. They conclude that the diverticulum is not congenital, but the result of a recurrent inflammation. The muscularis of the appendix has little power of regeneration, and may give way beneath an erosion of the mucous membrane. One or more so-called hernial diverticula may form. Later the diverticulum may become lined with mucous membrane.

SURGERY OF THE KIDNEY

HYPERNEPHROMA.—During the last few years the surgery and pathology of kidney tumors have excited considerable interest, and numerous contributions have appeared. The tumors of the kidney designated as hypernephroma are those which arise from aberrant adrenal tissue. These tumors are interesting clinically on account of the hematuria which may be the only sign of a kidney lesion and may be present from one to twenty years before the tumor has grown to a sufficient size to be palpated. The hematuria of a hypernephroma must be differentiated from the so-called essential renal hematuria or epistaxis of the kidney. Clinically these tumors manifest all grades of malignancy, from a strictly benign tumor to one of the most malignant type. The tumor may grow slowly, remain encapsulated, and not give metastasis for years. These patients remain well after excision. Now and then such an apparently benign tumor may suddenly exhibit rapid growth, increased hematuria, and a fatal result from metastasis may take place in a few months.

⁶⁸ Treatise on Appendicitis, by John B. Deaver, Chapter on the Pathology of Appendicitis.

⁶⁹ Beiträge z. klin. Chir., 1905, vol. xlv, p. 67.

⁷⁰ Revue de Chir., Oct., 1904, vol. xxx, p. 469.

In a few cases the malignant tendency is manifested from the onset of the growth. Hypernephromas are also striking on account of the fact that in a few instances the first sign of their presence may be a single bone metastasis which manifests itself clinically as a primary bone tumor. Scudder, of Boston, was good enough to send me a piece of tissue from the medullary cavity of the upper end of the humerus. Clinically the patient exhibited the symptoms of a primary medullary bone tumor; pathologically the neoplasm is a metastatic hypernephroma. Dr. Scudder informs me that he has been able to collect some nineteen cases.

Hypernephroma, therefore, may be likened to tumors of the thyroid and prostate, which not infrequently give rise to bone metastasis before the primary tumor is observed.

One desirous of becoming familiar with tumors, especially hypernephromas, of the kidney should begin with A. O. J. Kelly's ⁷¹ paper, now several years old, or with Keen, Pfahler, and Ellis's ⁷² or Küster's ⁷³ recent paper.

Küster's monograph impresses one with the fact that the experience of one surgeon or even one large clinic is too small to be considered sufficient for purposes of self-instruction or on which to base statistical conclusions. Küster calls attention to the fact that in two very large German clinics, during a period of about twenty-four years and among about 37,000 patients, lesions of the kidney were observed in only 0.59 per cent., and among these only 10 per cent. were neoplasms. Küster, in 1902, was able to collect from the literature only 773 cases of primary kidney tumors. Of these 51 had their origin in the adrenal gland, 70 in the capsule of the kidney, and 652 in the kidney proper.

Kuzmik,⁷⁴ in reporting three cases from Reczy's clinic in Budapest, reviews the literature up to February, 1905. These three cases illustrate the characteristic clinical picture of hypernephroma. The three patients were over fifty years of age; in two the hematuria was of recent date, the patients were unaware of the kidney tumor, which could be palpated at the first examination; one patient has remained well five years since operation; a second died of nephritis of the other kidney eighteen months after operation without clinical or autopsy evidence of

⁷¹ Ziegler's Beiträge, 1898, vol. xxiii, S. 283; Phila. Med. Jour., July 31, and August 6, 1898.

⁷² Trans. Col. Phys. Phila., 1904, vol. xxvi, page 250; Amer. Med., 1904.

⁷³ Deutsche Chirurgie, Lief., 52b., June, 1902; Die Chirurgischen Krankheiten der Niere, chapter xiii.

⁷⁴ Beiträge zur klin. Chir., 1905, vol. xlv, p. 185,

metastasis. The third patient illustrates the malignant type. This patient had been aware of the tumor for three years, but sought advice of the clinic because of recent hematuria and intense pain referred to the region of the sacrum; at operation the large tumor was fixed by perirenal infiltration; the growth had broken into and plugged the renal vein, and at the autopsy metastases were found in the bones, lungs and opposite kidney. Metastases to the opposite kidney are unique—Kuzmik found but two other cases in the literature.

The microscopic appearances of hypernephromas readily demonstrate why so many different varieties of neoplasms have been described in the kidney which, according to more recent views, should all be grouped under the term "hypernephroma renis." It is usually difficult and in many cases impossible to differentiate hypernephroma from endothelioma. These tumors arising from normal, but aberrant, adrenal tissue, vary in their gross and microscopic appearance, from that resembling closely the adrenal structure to cellular tumors of a most complex picture. The complexity of the more malignant tumors is due not only to change in the morphology of the proliferating adrenal cells, but to necrosis and hemorrhage, which usually take place as the tumor becomes more malignant. As the neoplasm increases in size more and more of the kidney structure is compressed and destroyed.

Dr. Wainwright, of Scranton, has just sent me a section of a retro-peritoneal tumor which was situated near the kidney, but not in it. Histologically it would be impossible to determine whether this is a hypernephroma or an endothelioma. The tumor was inoperable. Dr. McCleary, of Baltimore, has been good enough to show me the specimen of a large encapsulated tumor removed from the broad ligament; this also has a histologic structure which might be considered that of a hypernephroma. During the last year I have studied a number of specimens; in the majority it would be difficult to state positively whether the tumors are endothelioma or hypernephroma.

The literature on this subject is so voluminous that it is impossible to do more than allude to the more important contributions. Our knowledge, however, of kidney tumors is making definite progress, not only as to earlier clinical recognition and more radical operative treatment, but as to the differential diagnosis of the various forms and a knowledge of their relative malignancy.

Berkeley⁷⁵ gives a short but interesting note, with illustrations.

⁷⁵ Med. and Surg. Reports of the Presbyterian Hospital of New York, 1904, vol. vi, p. 170,

on the malposition of adrenal tissue in and on the kidney. The latter finding is important from the fact that we may have tumors of the structure of a hypernephroma entirely outside the kidney, a possibility in Wainwright's and McCleary's cases. Schmieden⁷⁶ contributes a very interesting paper, with illustrations, on the successful experimental misplacement of suprarenal tissue. Krönlein⁷⁷ reports on his experience covering a period of twenty years. Among 73 nephrectomies for lesions of the kidney 23 were performed for tumor, with but one death. This authority is unwilling to commit himself definitely as to the malignancy of the so-called hypernephroma. He calls attention to the well-known fact that the tumor may develop and give no sign of its presence, except in an occasional hematuria, until it has reached a size sufficient to attract the attention of its host. The hematuria was present in 16 out of his 20 cases, usually observed before the appearance of the tumor; as a rule the hemorrhage is seen but once, but there may also be repeated attacks. Krönlein will not commit himself to advocate an exploration of one or both kidneys when only the symptom hematuria is present; other authorities advise exploration as the best means of discovering and removing the possible concealed tumor in its early stage. Krönlein calls attention to an interesting symptom which may be present in some of these cases—the rapid appearance of a varicocele due to the compression of the spermatic vein by the tumor; it is called Guyon's sign. Krönlein had a number of cured cases, but observed no bone metastasis. He agrees with other authorities in advising the lumbar incision and in extensively removing with the tumor and kidney the perirenal fat, as in some cases this may be infiltrated, and when left behind give rise to local recurrence.

Neuhäuser⁷⁸ reports on some peculiar and so far unknown types of renal hypernephroma. He calls attention to the presence of large quantities of adipose tissue in these tumors. The communication is important from a pathologic standpoint only.

Dr. Bevan,⁷⁹ of Chicago, exhibited a specimen before the Surgical Society, in which the hematuria was so marked that at the operation the patient showed evidence of profound secondary anemia. In this case the kidney tumor projected into the pelvis and undoubtedly was the cause of the unusual hemorrhage. Küster calls attention to this possi-

⁷⁶ Deutsche Zeitschr. f. Chir., 1903, vol. lxx, p. 453.

⁷⁷ Centralbl. f. Chir., 1905, vol. xxxii, p. 1022.

⁷⁸ Centralbl. f. Chir., 1905, vol. xxxii, p. 923.

⁷⁹ Ann. of Surg., 1904, vol. xxxix, p. 468.

bility in the more malignant renal tumors. When this is present a differential diagnosis is difficult from the primary tumors of the renal pelvis, which have been considered by Pels-Leusden.⁸⁰ The latter are usually rare tumors of the kidney, and as a rule not as malignant as the primary intrarenal tumor, in which the excessive hematuria is associated with a fungous growth into the pelvis. Bevan's experience has been chiefly with the more malignant type, and in a recent letter he writes that he has had at least six cases of hypernephroma during the last year. At the same meeting Plummer reported a case in which the symptom of onset in a man of 68 years of age was profuse hematuria, present but once, fourteen months before operation; the tumor was found by the patient two months before operation; after its removal it was found that the entire kidney was replaced by the large neoplasm. Dr. Plummer writes me that this patient died six months after operation, with evidence of local recurrence.

Wyss,⁸¹ of Krönlein's clinic, has published a very valuable monograph on the different forms of tumor of the kidney, which is excellently illustrated.

Bone Metastases from Hypernephroma.—My attention was directed to this possibility by a review of Albrecht's paper before the last German Congress.⁸² The chief interest of this paper was due to the fact that in four of Albrecht's twenty-seven cases of hypernephroma a primary bone metastasis was the first symptom of the disease. In one case the scapula, the seat of the metastatic focus, was removed; this patient was apparently well eighteen months after operation. In a second case the focus in the occipital bone showed ossification, resembling, therefore, that observed in metastatic carcinoma, the so-called osteoplastic carcinosis of von Recklinghausen. Albrecht records another very interesting fact—the possibility of late recurrences after the removal of the kidney tumor; he has observed one in eight, another in twenty-five years. One of Albrecht's cases is of interest because it represents a late recurrence after nephrectomy for hypernephroma, demonstrating that operations for the complete removal of bone metastases of this disease are justifiable. This patient was a female, aged 28 years; she sought advice of the surgical clinic

⁸⁰ Archiv. f. klin. Chir., 1902, vol. xxxii, p. 687.

⁸¹ Beiträge zur klin. Chir., 1902, vol. xxxii, p. 1.

⁸² Centralbl. f. Chir., 1905, vol. xxxii, No. 30, p. 112; Archiv f. klin. Chir., 1905, lxxvii, p. 1071.

because of a movable tumor in the left loin, which had been present a few months; previous to this she had suffered for a short time with pain; there was no hematuria. On account of the great movability of the tumor the possibility of a movable spleen was considered; at operation the tumor proved to be the kidney, the upper pole of which was replaced by a cap-shaped tumor-mass resting on the lower pole like a mushroom; the patient remained well for over three years, and then returned with a tumor of the scapula. Both tumors had the histologic appearances of a hypernephroma.

The second case represents the clinical picture of a primary bone-tumor. The patient was a male, aged 48 years, who sought advice of the clinic because of pain and swelling in the lower end of the femur and knee-joint, which had followed immediately after a trauma nineteen months ago; there had been no hematuria; the tumor was soft and almost elastic; the x-rays showed a defect in the shaft of the femur above the condyles. When removed the tumor was very hemorrhagic and soft, arising undoubtedly from the medullary cavity; the microscopic examination at once indicated a metastatic hypernephroma. A careful abdominal examination was only made after operation. In the right side in the region of the kidney there was a nodular apple-sized tumor; the patient refused nephrectomy, and died four months after leaving the hospital. This case illustrates the importance of a careful abdominal examination. In reality this is not a primary bone-tumor without any evidence of an abdominal neoplasm. It was considered so clinically only because a careful palpation of the abdomen was not made.

In the third case, however, repeated examinations failed to find the kidney-tumor revealed at autopsy. A most careful search was made for this renal tumor after a microscopic study of the fungous tumor present on the shoulder proved it to be a metastatic hypernephroma. The patient was a female, aged 66; when she first came under observation at another clinic the soft doughy mass in the region of the shoulder, which had been present some months, was diagnosed a tubercular abscess in spite of an x-ray examination. This x-ray showed a complete absence of the outer third of the clavicle, a picture of bone destruction present only in neoplasms; on this diagnosis an incision was made in the apparently fluctuating tumor; on division of the capsule the hemorrhage from the friable tumor was so intense that it was necessary to pack the wound and abandon the operation. From this incision a fungous mass rapidly grew. Unless the tumor was kept tightly compressed with gauze there was severe hemorrhage. The patient

died from hemorrhage six weeks after admission to the clinic. The autopsy demonstrated a small hypernephroma in the upper part of the kidney and in addition to the metastatic tumor, already noted, there was a small focus in the right adrenal and in the lower lobe of the left lung. The probabilities are that this patient would have lived much longer had the metastatic tumor of the left clavicle been properly interpreted and radically removed. It is quite possible that the patient might have lived in comfort for some years. We have already referred to the possibility of a duration of life of eight to twenty-five years after the removal of the primary tumor.

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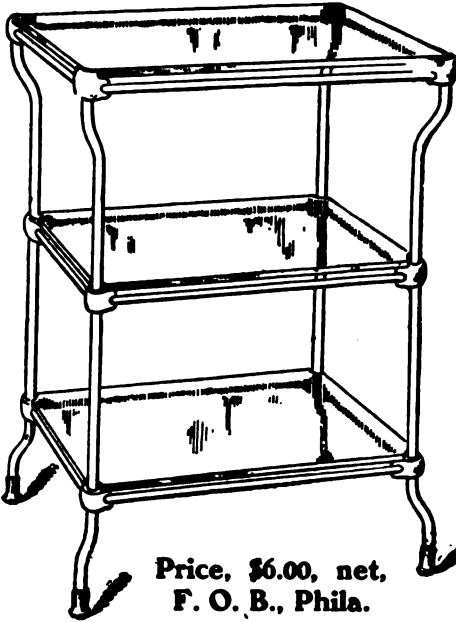
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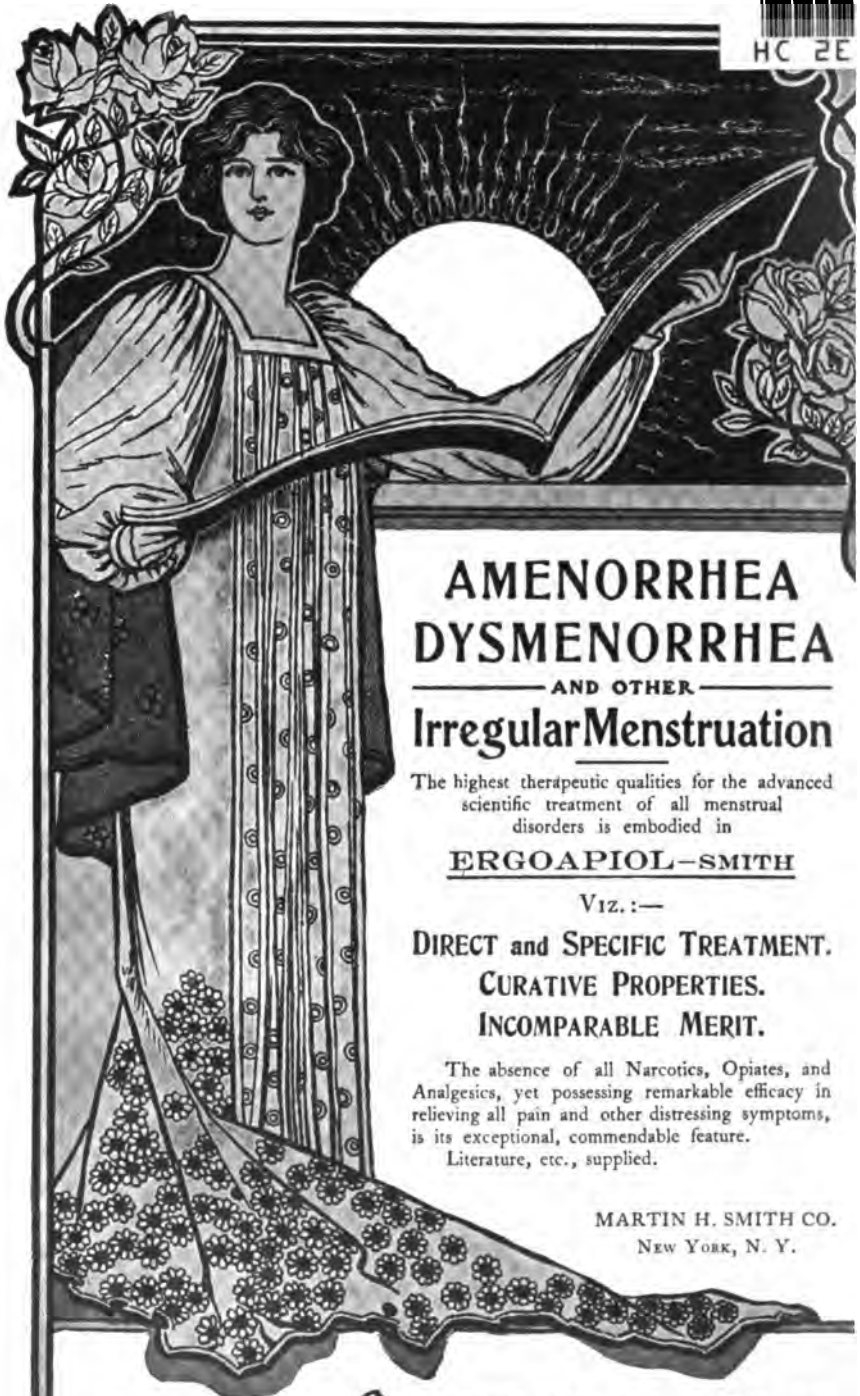
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